RP11-C/RP03

DISK PACK FORMATTER

MD-11-DZRPD-B

EP-DZRPD-B-DL A

OCT 1976

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IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DZRPD-B-D
PRODUCT NAME:	RP11C DISK PACK FORMATTER
DATE CREATED:	JUNE 15, 1973
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	JOE STUBBLEBINE

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MAYNARD, MASS.

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1.0 ABSTRACT

THE RP11C FORMATTER CONSISTS OF THREE PARTS. PART 1 FORMATS AN RP03 DISK IN THE NORMAL MANNER AND CHECKS ALL ADDRESSES FOR VALIDITY. PART 2 ALLOWS THE OPERATOR TO REWRITE THE HEADER OF ANY DESIRED SECTOR. PART 3 FORMATS AND VERIFIES THE DISK WITH THE SEQUENCE OF SECTOR ADDRESSES SPECIFIED BY THE OPERATOR.

2.0 REQUIREMENTS

2.1 EQUIPMENT

STANDARD PDP-11 CONFIGURATION
RP11C DISK CONTROLLER
ONE OR MORE RP03 DISK DRIVES

2.2 STORAGE

PROGRAM REQUIRES 4K OF STORAGE

2.3 PRELIMINARY PROGRAMS

DZRPA DISKLESS DIAGNOSTIC
DZRPB RP11C RELIABILITY DIAGNOSTIC

3.0 LOADING PROCEDURE

USE STANDARD PROCEDURE FOR ABS TYPES.

4.0 STARTING PROCEDURE

4.1 CONTROL SWITCH SETTING

SEE SECTION 5.1.1

```
   123                          4.2     STARTING ADDRESS
```

THE PROGRAM MAY BE STARTED AT ONE OF FOUR LOCATIONS

1. STARTING ADDRESS 200 WILL FORMAT THE ENTIRE PACK AND THEN VERIFY THAT THE HEADERS HAVE BEEN WRITTEN CORRECTLY.

2. STARTING ADDRESS 250 WILL ALLOW THE OPERATOR TO SPECIFY A PARTICULAR HEADER TO BE REWRITTEN AND VERIFIED

3. STARTING ADDRESS 300 WILL FORMAT THE ENTIRE PACK USING THE SECTOR ADDRESS SEQUENCE PROVIDED BY THE OPERATOR. AFTER FORMATTING THE PACK IS VERIFIED.

4. STARTING ADDRESS 350 ALLOWS THE OPERATOR TO VERIFY ALL THE HEADERS ON THE PACK.

4.3 PROGRAM AND/OR OPERATOR ACTION

1. LOAD THE PROGRAM INTO MEMORY USING THE ABS LOADER.

2. LOAD DESIRED STARTING ADDRESS

3. SET SWITCHES (SEE SEC 5.1.1)

4. PRESS START

5. WHEN THE PROGRAM IS COMPLETE, IT TYPES OUT "TEST COMPLETE" AND HALTS.

5.0 OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

AFTER LOADING STARTING ADDRESS SELECT THE DESIRED SWITCHES.

5.1.1 SWITCH SETTINGS ARE:

```
SW<15>=1.....HALT ON ERROR
SW<14>  .....NOT USED
SW<13>=1.....INHIBIT PRINTOUT
SW<12>  .....NOT USED
SW<11>  .....NOT USED
SW<10>=1.....BELL ON ERROR
```

5.2 SUBROUTINE ABSTRACTS

5.2.1 TRAPCATCHER

A ".+2" - "HALT" SEQUENCE IS REPEATED FROM 0-776 TO CATCH ANY UNEXPECTED TRAPS. THUS ANY UNEXPECTED TRAPS OR INTERRUPTS WILL HALT AT THE VECTOR +2.

5.2.2 ERROR HANDLER

THIS ROUTINE IS ENTERED UPON DETECTION OF AN ERROR. THE ERROR ADDRESS, PDP-11 STATUS, AND RELEVENT ERROR INFORMATION IS TYPED OUT. RING THE BELL, INHIBIT TYPEOUTS, AND HALT ON ERROR SWITCHES ARE TESTED.

6.0 ERRORS

6.1 ERROR PRINTOUTS

#1 ERROR MESSAGE FORMAT:

```
ERROR AT ADDRESS XXXX  PS= PROCESSOR STATUS
CALLED FROM SUBROUTINE AT YYY
RPCS =   CONTENTS OF RPCS
RPCS =   CONTENTS OF RPCS
RPER =   CONTENTS OF RPER
RPDS =   CONTENTS OF RPDS

XXXX =   THE ADDRESS WHERE THE ERROR WAS
         ENCOUNTERED.
YYY  =   IF THE ERROR WAS ENCOUNTERED IN A
SUBROUTINE, THIS ADDRESS REFERS BACK TO THE
MAINLINE CODE WHICH CALLED THE SUBROUTINE.
```

```
230                                     #2  ERROR AT ADDRESS XXXX PS= PROCESSOR STATUS
231                                         CALLED FROM SUBROUTINE AT YYY
```

	CYLINDER	TRACK	SECTOR
GOOD =	-	-	-
BAD =	-	-	-

THIS MESSAGE IS GIVEN IF AN ERROR OCCURS WHILE VERIFYING A HEADER. GOOD EQUALS THE EXPECTED CONTENTS OF THE HEADER AND BAD EQUALS WHAT WAS ACTUALLY FOUND IN THE HEADER.

7.0 RESTRICTIONS

NONE

8.0 MISCELLANEOUS

8.1 EXECUTION TIME

AFTER PERFORMING THE SELECTED TASK, THE PROGRAM WILL TYPE TEST COMPLETE AND HALT.

8.2 STACK POINTER

THE STACK IS INITIALLY SET TO 600.

9.0 PROGRAM DISCRIPTION

9.1 STANDARD FORMATTER

ONCE STARTED THE PROGRAM TYPES:

UNIT

AND WAITS FOR INPUT. RESPOND WITH THE RELEVENT OCTAL NUMBER (0-7) AND TERMINATE WITH A CARRIAGE RETURN.

THE TTY THEN PRINTS:

SET THE FORMAT ENABLE SWITCH.
SET THE RP11C WRITE ENABLE SWITCH.
SET THE SELECTED UNIT WRITE ENABLE SWITCH.

```
  288                           STRIKE ANY TELETYPE KEY WHEN READY.
```

STRIKING ANY KEY CAUSES THE FORMATTING OPERATION TO BEGIN. WHEN THE DISK HAS BEEN FORMATTED, THE TTY PRINTS:

RESET THE FORMAT ENABLE SWITCH TO NORMAL.
STRIKE ANY TELETYPE KEY WHEN READY.

STRIKING ANY KEY CAUSE THE PROGRAM TO ENTER A READ/COMPARE HEADER SEQUENCE. WHEN COMPLETE THE PROGRAM TYPES TEST COMPLETE.

9.2 SINGLE HEADER FORMATTER

ONCE STARTED, THE PROGRAM QUERIES FOR THE UNIT NUMBER AS IN 9.1. THE PROGRAM THEN PRINTS:

```
CYLINDER     TRACK SECTOR
OLD:
```

AND WAITS FOR INPUT.
TYPE THE PHYSICAL CYLINDER, TRACK, AND SECTOR OF THE DESIRED ADDRESS; TERMINATE THE FIRST TWO WITH A SPACE AND THE LAST WITH A CARRIAGE RETURN.
THE PROGRAM THEN TYPES:

```
NEW
```

AND WAITS FOR INPUT. THE THE DESIRED ADDRESS IN THE SAME SEQUENCE AS ABOVE. THE PROGRAM WILL FIRST REWRITE AND THEN READ THE DESIRED HEADER TO DETERMINE VALIDITY. WHEN FINISHED THE PROGRAM TYPES TEST COMPLETE AND HALTS.

9.3 SPECIAL FORMATTER

ONCE STARTED, THE PROGRAM QUERIES FOR THE UNIT NUMBER AS IN 9.1. THE PROGRAM THEN PRINTS:

INPUT THE SECTOR NUMBERS (0-9) IN THE DESIRED ORDER.

```
0:
```

RESPOND WITH THE FIRST DESIRED SECTOR NUMBER. THE OTHER NINE NUMBERS ARE REQUESTED AND SPECIFIED IN LIKE MANNER. ONCE A SECTOR NUMBER HAS BEEN USED IT CANNOT BE SPECIFIED AGAIN.

AFTER THE LAST PARAMETER HAS BEEN PROCESSED, THE PROGRAM WRITE THE PACK TO THE DESIRED FORMAT AND

```
                                THEN ENTERS A READ/COMPARE HEADER SEQUENCE TO ENSURE
                                THE  VALIDITY OF ALL ADDRESSES.  WHEN THE PROGRAM IS
```

```
                                                                    PAGE 8


                        FINISHED IT TYPES TEST COMPLETE AND HALTS.  %

                        ;RP11 DISK FORMATTER
                        ;ROBERT J. COLLINS
                        ;JANUARY 29,1971

177570                  SR=177570               ;SWITCH REGISTER
177776                  CC=177776               ;CONDITION CODES
177560                  TKS=177560
177562                  TKB=177562
177564                  TPS=177564
177566                  TPB=177566
000060                  TKV=60
000064                  TPV=64

000015                  CR=15
000012                  LF=12
000006                  SP=%6                   ;STACK POINTER
000000                  R0=%0
000001                  R1=%1
000002                  R2=%2
000003                  R3=%3
000004                  R4=%4
000005                  R5=%5
000006                  R6=%6
000007                  R7=%7
000007                  PC=%7
000000                  XX=HALT
177776                  PS=CC
000240                  NOP=240
000000                  P0=0
000040                  P1=40
000100                  P2=100
000140                  P3=140
000200                  P4=200
000240                  P5=240
000300                  P6=300
000340                  P7=340
000001                  B0=1
000002                  B1=2
000004                  B2=4
000010                  B3=10
000020                  B4=20
000040                  B5=40
000100                  B6=100
000200                  B7=200
000400                  B8=400
001000                  B9=1000
002000                  B10=2000
004000                  B11=4000
010000                  B12=10000
020000                  B13=20000
040000                  B14=40000
```

```
                        B15=100000
                        ERR=EMT
                        ERM=TRAP
                        GB=B0
                        DD=B1
                        DS=B2
                        ER=B3
                        CS=B4
                        DA=B5
                        HD=B6
                        POP=5726
                        POPPOP=22626

                                .MACR   ANDI    A,B
                                BIC     #-A-1,B ;MASK A APPLIED TO B
                                .ENDM


                                .MACR   PNTM A
                                MOV     #A,R0           ;PRINT MESSAGE
                                JSR     PC,TYPOUT       ;POINTED TO BY A
                                .ENDM

                                .MACR   PNTOL A
                                MOV     A,R0            ;PRINT 6 OCTAL
                                JSR     PC,PNTOCT       ;NUMBERS IN A
                                .ENDM



                        000000  .=0
                                .REPT   140
                                .+2                     ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
                                HALT
                                .ENDR
000000  000002                  .+2                     ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
000002  000000                  HALT
000004  000006                  .+2                     ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
000006  000000                  HALT
000010  000012                  .+2                     ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
000012  000000                  HALT
000014  000016                  .+2                     ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
000016  000000                  HALT
000020  000022                  .+2                     ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
000022  000000                  HALT
000024  000026                  .+2                     ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
000026  000000                  HALT
000030  000032                  .+2                     ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
000032  000000                  HALT
000034  000036                  .+2                     ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
000036  000000                  HALT
000040  000042                  .+2                     ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
000042  000000                  HALT
000044  000046                  .+2                     ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
000046  000000                  HALT
```

```
459  000050  000052                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
460  000052  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
461  000054  000056                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
462  000056  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
463  000060  000062                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
464  000062  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
465  000064  000066                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
466  000066  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
467  000070  000072                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
468  000072  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
469  000074  000076                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
470  000076  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
471  000100  000102                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
472  000102  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
473  000104  000106                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
474  000106  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
475  000110  000112                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
476  000112  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
477  000114  000116                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
478  000116  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
479  000120  000122                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
480  000122  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
481  000124  000126                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
482  000126  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
483  000130  000132                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
484  000132  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
485  000134  000136                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
486  000136  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
487  000140  000142                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
488  000142  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
489  000144  000146                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
490  000146  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
491  000150  000152                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
492  000152  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
493  000154  000156                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
494  000156  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
495  000160  000162                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
496  000162  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
497  000164  000166                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
498  000166  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
499  000170  000172                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
500  000172  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
501  000174  000176                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
502  000176  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
503  000200  000202                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
504  000202  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
505  000204  000206                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
506  000206  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
507  000210  000212                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
508  000212  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
509  000214  000216                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
510  000216  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
511  000220  000222                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
512  000222  000000                  HALT                ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
513  000224  000226                  .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
514  000226  000000                  HALT
```

```
 515  000230  000232                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 516  000232  000000                HALT
 517  000234  000236                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 518  000236  000000                HALT
 519  000240  000242                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 520  000242  000000                HALT
 521  000244  000246                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 522  000246  000000                HALT
 523  000250  000252                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 524  000252  000000                HALT
 525  000254  000256                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 526  000256  000000                HALT
 527  000260  000262                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 528  000262  000000                HALT
 529  000264  000266                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 530  000266  000000                HALT
 531  000270  000272                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 532  000272  000000                HALT
 533  000274  000276                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 534  000276  000000                HALT
 535  000300  000302                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 536  000302  000000                HALT
 537  000304  000306                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 538  000306  000000                HALT
 539  000310  000312                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 540  000312  000000                HALT
 541  000314  000316                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 542  000316  000000                HALT
 543  000320  000322                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 544  000322  000000                HALT
 545  000324  000326                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 546  000326  000000                HALT
 547  000330  000332                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 548  000332  000000                HALT
 549  000334  000336                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 550  000336  000000                HALT
 551  000340  000342                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 552  000342  000000                HALT
 553  000344  000346                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 554  000346  000000                HALT
 555  000350  000352                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 556  000352  000000                HALT
 557  000354  000356                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 558  000356  000000                HALT
 559  000360  000362                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 560  000362  000000                HALT
 561  000364  000366                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 562  000366  000000                HALT
 563  000370  000372                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 564  000372  000000                HALT
 565  000374  000376                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 566  000376  000000                HALT
 567  000400  000402                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 568  000402  000000                HALT
 569  000404  000406                .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
 570  000406  000000                HALT
```

```
  571  000410  000412                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  572  000412  000000                    HALT
  573  000414  000416                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  574  000416  000000                    HALT
  575  000420  000422                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  576  000422  000000                    HALT
  577  000424  000426                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  578  000426  000000                    HALT
  579  000430  000432                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  580  000432  000000                    HALT
  581  000434  000436                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  582  000436  000000                    HALT
  583  000440  000442                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  584  000442  000000                    HALT
  585  000444  000446                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  586  000446  000000                    HALT
  587  000450  000452                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  588  000452  000000                    HALT
  589  000454  000456                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  590  000456  000000                    HALT
  591  000460  000462                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  592  000462  000000                    HALT
  593  000464  000466                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  594  000466  000000                    HALT
  595  000470  000472                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  596  000472  000000                    HALT
  597  000474  000476                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  598  000476  000000                    HALT
  599  000500  000502                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  600  000502  000000                    HALT
  601  000504  000506                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  602  000506  000000                    HALT
  603  000510  000512                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  604  000512  000000                    HALT
  605  000514  000516                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  606  000516  000000                    HALT
  607  000520  000522                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  608  000522  000000                    HALT
  609  000524  000526                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  610  000526  000000                    HALT
  611  000530  000532                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  612  000532  000000                    HALT
  613  000534  000536                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  614  000536  000000                    HALT
  615  000540  000542                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  616  000542  000000                    HALT
  617  000544  000546                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  618  000546  000000                    HALT
  619  000550  000552                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  620  000552  000000                    HALT
  621  000554  000556                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  622  000556  000000                    HALT
  623  000560  000562                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  624  000562  000000                    HALT
  625  000564  000566                    .+2                 ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  626  000566  000000                    HALT
```

```
  627  000570  000572                    .+2                     ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  628  000572  000000                    HALT
  629  000574  000576                    .+2                     ;TRAPPED OR INTERRUPTED TO PREVIOUS ADDRESS
  630  000576  000000                    HALT
  631
  632          000030                    .=30
  633  000030  004664                    .WORD   ERROR
  634  000032  000340                    .WORD   340
  635  000034  004664                    .WORD   ERROR
  636  000036  000340                    .WORD   340
  637
  638
  639
  640          000200                    .=200
  641  000200  012707  000600            MOV     #START1,PC
  642          000250                    .=250
  643  000250  012707  001346            MOV     #START2,PC
  644          000300                    .=300
  645  000300  012707  002102            MOV     #START3,PC
  646          000350                    .=350
  647  000350  012707  001014            MOV     #START4,PC
  648          000600                    .=600
  649
```

```
                                        .TITLE  RP11C DISK PACK FORMATTER
                                        .SBTTL  ** STANDARD FORMATTER **

                                        ;THIS ROUTINE WILL FORMAT THE ENTIRE PACK AND THEN VERIFY
                                        ;THE HEADERS WITHIN EACH SECTOR. STARTING ADDRESS IS 200.

000600  012706  000600          START1: MOV     #START1,SP      ;INITIALIZE STACK POINTER
000604  012767  000340  177164          MOV     #P7,CC          ;LOCKOUT OTHER DEVICES
000612  000005                          RESET                   ;CLEAR THE WORLD
000614  004767  002314          IL1:    JSR     PC,UNIQ         ;GET UNIT#
000620                          URDY1:  PNTM    SWMES
000620  012700  004201                  MOV     #SWMES,R0               ;PRINT MESSAGE
000624  004767  006004                  JSR     PC,TYPOUT       ;POINTED TO BY SWMES
000630  004767  003140                  JSR     PC,RIN          ;WAIT FOR KEYBOARD RESPONSE

000634  004767  002474          NS2:    JSR     PC,HOME         ;HOME SEEK
000640  012777  000732  006200          MOV     #RPI,@RPIV      ;RP11 PI VECTO
000646  012777  000340  006174          MOV     #P7,@RPSV       ;RP11 PI STATUS
000654  012777  000001  006120          MOV     #1,@RPWC        ;ALLOW DSH BREAKS
000662  062777  014103  006106          ADD     #14103,@RPCS    ;WRITE 10/15 HEADER (FORMAT) WITH PI ON
000670  112767  000200  177100          MOVB    #P4,PS          ;LOWER CPU PRIORITY
000676  017704  006110          IL2:    MOV     @RPDA,R4        ;SAVE ADDRESS
000702  012767  177770  005776          MOV     #177770,TOG1    ;SETUP TIMEOUT
000710  020477  006076          IL3:    CMP     R4,@RPDA        ;HAS ADDRESS CHANGED?
000714  001370                          BNE     IL2             ;YES - RECYCLE
000716  005367  005764                  DEC     TOG1            ;NO - HAS 100 MSEC. TIMED OUT?
000722  001372                          BNE     IL3             ;NO - KEEP CHECKING
000724  104074                          ERR+DS+CS+ER+DA         ;DISK ADDRESS NOT CHANGING IN TIME
000726  000167  177702                  JMP     NS2             ;TRY AGAIN
000732  004567  005474          RPI:    JSR     R5,SAVD5        ;RP11 PI HANDLER - SAVE R0-5
000736  032777  100000  006032          BIT     #B15,@RPCS      ;ERROR?
000744  001407                          BEQ     PIOK1           ;NO
000746  104034                          ERR+ER+CS+DS            ;ERROR DURING FORMAT GENERATION
000750  004567  005472          RPIX:   JSR     R5,RESTD5       ;RESTORE R0-5
000754  005726                          POP                     ;POP OLD PC
000756  012746  000634                  MOV     #NS2,-(SP)      ;PUSH A NEW PC
000762  000002                          RTI                     ;EXIT
000764  032777  000200  006004  PIOK1:  BIT     #B7,@RPCS       ;DONE?
000772  001002                          BNE     .+6             ;YES
000774  104050                          ERR+CS+ER+CS            ;EXTRANEOUS PI DURING FORMAT PASS
000776  000764                          BR      RPIX            ;TRY AGAIN
001000  004567  005442                  JSR     R5,RESTD5       ;RESTORE R0-5
001004  005726                          POP                     ;POP OLD PC
001006  012746  001034                  MOV     #STR4,-(SP)     ;PUSH A NEW PC
001012  000002                          RTI                     ;EXIT TO PASS 2


001014  012706  000600          START4: MOV     #START1,SP
001020  012767  000340  176750          MOV     #P7,CC
001026  000005                          RESET
001030  004767  002100                  JSR     PC,UNIQ
001034  012767  000340  176734  STR4:   MOV     #P7,PS          ;LOCKOUT PI'S
001042                          PNTM    NSWMES
001042  012700  004423                  MOV     #NSWMES,R0              ;PRINT MESSAGE
001046  004767  005562                  JSR     PC,TYPOUT       ;POINTED TO BY NSWMES
```

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001052  004767  002716                  JSR     PC,RIN          ;WAIT FOR OPERATOR
001056  012777  000001  005712  P2L1:   MOV     #1,@RPCS        ;RESET RP11
001064  116777  005636  005706          MOVB    UNIT,@RPCS1     ;LOAD UNIT #
001072  004767  002236                  JSR     PC,HOME         ;HOME SEEK
001076  005067  005630                  CLR     CYL             ;CYL=0
001102  016777  005624  005676  P2L2:   MOV     CYL,@RPCA       ;START AT
001110  005077  005676                  CLR     @RPDA           ;SAR & TAR = 0
001114  112777  000011  005654          MOVB    #11,@RPCS       ;SEEK
001122  036777  005602  005636          BIT     ATNB,@RPDS      ;WAIT FOR
001130  001774                          BEQ     .-6             ;ATTN.
001132  112777  000377  005626          MOVB    #377,@RPDS      ;CLEAR ATTN
001140  032777  004000  005620          BIT     #B11,@RPDS      ;DONE?
001146  001402                          BEQ     .+6             ;YES
001150  104074                          ERR+ER+CS+DS+DA         ;NO- SEEK INCOMPLETE ON PASS2 SEEK
001152  000741                          BR      P2L1            ;TRY AGAIN
001154  012777  176650  005620          MOV     #-600.,@RPWC    ;READ ONE CYLINDER OF HEADERS INTO
001162  012777  007252  005614          MOV     #INBUF,@RPBA    ;BUFFER
001170  052777  014000  005600          BIS     #14000,@RPCS    ;10/15 HEADER MODE
001176  112777  000005  005572          MOVB    #5,@RPCS        ;READ HEADERS
001204  032777  100200  005564          BIT     #B15+B7,@RPCS   ;ERROR OR DONE
001212  001774                          BEQ     .-6             ;NOT YET
001214  100002                          BPL     P2N1            ;DONE
001216  104074                          ERR+ER+DS+CS+DA         ;ERROR ON READ HEADER OP.
001220  000730                          BR      P2L2            ;RECYCLE


001222  005067  005506          P2N1:   CLR     HED             ;START ADDRESS CHECKING
001226  005067  005504                  CLR     SEC             ;INITIALIZE GOOD DATA
001232  012704  007252                  MOV     #INBUF,R4       ;POINTER TO DATA READ
001236  004767  002222          P2L3:   JSR     PC,CHKAD        ;CHECK DATA
001242  000240                          NOP                     ;NO LOOPING
001244  005267  005466                  INC     SEC             ;ADVANCE SEC#
001250  026727  005462  000011          CMP     SEC,#9.         ;OVFLO?
001256  101002                          BHI     .+6             ;YES
001260  000167  177752                  JMP     P2L3            ;NO- CHECK NEXT ADDRESS
001264  005067  005446                  CLR     SEC
001270  005267  005440                  INC     HED             ;ADVANCE HEAD#
001274  026727  005434  000023          CMP     HED,#19.        ;OVFLO?
001302  101002                          BHI     .+6             ;YES
001304  000167  177726                  JMP     P2L3            ;NO- CHECK NEXT ADDRESS
001310  005067  005420                  CLR     HED
001314  005267  005412                  INC     CYL             ;ADVANCE CYL#
001320  026727  005406  000625          CMP     CYL,#405.       ;DONE ALL?
001326  101002                          BHI     1$              ;YES
001330  000167  177546                  JMP     P2L2            ;NO- READ ANOTHER BLOCK
001334                          1$:     PNTM    ENDM1
001334  012700  006411                  MOV     #ENDM1,R0               ;PRINT MESSAGE
001340  004767  005270                  JSR     PC,TYPOUT       ;POINTED TO BY ENDM1
001344  000000                          HALT
```

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                                        .SBTTL  ** SINGLE HEADER FORMATTER **

                                        ;THIS ROUTINE ALLOWS THE OPERATOR TO SPECIFY A PARTICULAR
                                        ;HEADER TO BE FORMATTED AND THEN VERIFIED. THE STARTING ADDR
                                        ;IS 250.

001346  012706  000600          START2: MOV     #START1,SP      ;SET STACK POINTER
001352  012767  000340  176416          MOV     #P7,CC          ;LOCKOUT PI
001360  000005                          RESET                   ;CLEAR THE WORLD
001362  004767  001546                  JSR     PC,UNIQ         ;GET UNIT
001366                                  PNTM    HDMS
001366  012700  006122                  MOV     #HDMS,R0                ;PRINT MESSAGE
001372  004767  005236                  JSR     PC,TYPOUT       ;POINTED TO BY HDMS
001376                          HL1:    PNTM    OLDMS
001376  012700  006213                  MOV     #OLDMS,R0               ;PRINT MESSAGE
001402  004767  005226                  JSR     PC,TYPOUT       ;POINTED TO BY OLDMS
001406  012705  000625                  MOV     #405.,R5        ;HIGHEST CYLINDER
001412  004767  001644                  JSR     PC,PARIN        ;FETCH PARAMETER
001416  000767                          BR      HL1             ;ERROR RECYCLE
001420  016767  005274  005320          MOV     WORK1,CYLA      ;SAVE VALUE
001426  012705  000023                  MOV     #19.,R5         ;HIGHEST TRACK
001432  004767  001624                  JSR     PC,PARIN        ;FETCH PARAMETER
001436  000757                          BR      HL1             ;ERROR RECYCLE
001440  016767  005254  005302          MOV     WORK1,HEDA      ;SAVE VALUE
001446  004767  002202                  JSR     PC,TTIO         ;FETCH PARAMETER
001452  000751                          BR      HL1             ;ERROR RECYCLE
001454  020027  000011                  CMP     R0,#9.          ;HIGHEST SECTOR
001460  101346                          BHI     HL1             ;TOO BIG
001462  010067  005264                  MOV     R0,SECA         ;SAVE VALUE
001466                          HL2:    PNTM    NEWMS
001466  012700  006226                  MOV     #NEWMS,R0               ;PRINT MESSAGE
001472  004767  005136                  JSR     PC,TYPOUT       ;POINTED TO BY NEWMS
001476  012705  000625                  MOV     #405.,R5        ;HIGHEST CYLINDER
001502  004767  001554                  JSR     PC,PARIN        ;FETCH PARAMETER
001506  000767                          BR      HL2             ;ERROR RECYCLE
001510  016767  005204  005214          MOV     WORK1,CYL       ;SAVE VALUE
001516  012705  000023                  MOV     #19.,R5         ;HIGHEST TRACK
001522  004767  001534                  JSR     PC,PARIN        ;FETCH PARAMETER
001526  000757                          BR      HL2             ;ERROR RECYCLE
001530  016767  005164  005176          MOV     WORK1,HED       ;SAVE VALUE
001536  004767  002112                  JSR     PC,TTIO         ;FETCH PARAMETER
001542  000751                          BR      HL2             ;ERROR RECYCLE
001544  020027  000011                  CMP     R0,#9.          ;HIGHEST SECTOR
001550  101346                          BHI     HL2             ;TOO BIG
001552  010067  005160                  MOV     R0,SEC          ;SAVE VALUE


001556  005067  005470          HGO:    CLR     INBUF           ;HWRD1=0
001562  016767  005150  005466          MOV     SEC,INBUF+4     ;HWRD3=SECTOR
001570  016767  005136  005456          MOV     CYL,INBUF+2
001576  006167  005452                  ROL     INBUF+2
001602  006167  005446                  ROL     INBUF+2
001606  006167  005442                  ROL     INBUF+2
001612  006167  005436                  ROL     INBUF+2
001616  006167  005432                  ROL     INBUF+2
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  815  001622  006167  005426                    ROL     INBUF+2
  816  001626  006167  005102                    ROL     HED
  817  001632  056767  005076  005414            BIS     HED,INBUF+2
  818  001640  006067  005070                    ROR     HED
  819  001644  042767  100001  005402            BIC     #100001,INBUF+2
  820  001652  004767  001456          HGL1:     JSR     PC,HOME         ;HOME SEEK
  821  001656  012777  177775  005116            MOV     #-3,@RPWC       ;WORD COUNT
  822  001664  012777  007252  005112            MOV     #INBUF,@RPBA    ;BUFFER ADDRESS
  823  001672  052777  014000  005076            BIS     #14000,@RPCS    ;10/15 MODE HEADER OP
  824  001700  016777  005042  005100            MOV     CYLA,@RPCA      ;LOAD CYLINDER
  825  001706  116777  005036  005100            MOVB    HEDA,@RPDA1     ;TRACK,
  826  001714  116777  005032  005070            MOVB    SECA,@RPDA      ;AND SECTOR TO BE CHANGED
  827  001722  112777  000003  005046            MOVB    #3,@RPCS        ;REWRITE IT
  828  001730  032777  100200  005040            BIT     #B15+B7,@RPCS   ;ERROR OR DONE?
  829  001736  001774                            BEQ     .-6             ;NOT YET
  830  001740  100002                            BPL     HG01            ;DONE
  831  001742  104074                            ERR+ER+DS+CS+DA         ;ERROR ON WRITE HEADER OP
  832  001744  000742                            BR      HGL1            ;TRY AGAIN
  833  001746  005067  005300          HG01:     CLR     INBUF           ;DESTROY
  834  001752  005067  005276                    CLR     INBUF+2         ;OLD
  835  001756  005067  005274                    CLR     INBUF+4         ;DATA
  836  001762  004767  001346          HGL2:     JSR     PC,HOME         ;HOME SEEK
  837  001766  012777  177775  005006            MOV     #-3,@RPWC       ;WORD COUNT
  838  001774  012777  007252  005002            MOV     #INBUF,@RPBA    ;BUFFER
  839  002002  016777  004740  004776            MOV     CYLA,@RPCA      ;DISK
  840  002010  116777  004734  004776            MOVB    HEDA,@RPDA1     ;ADDRESS
  841  002016  116777  004730  004766            MOVB    SECA,@RPDA      ;TO BE FOUND
  842  002024  052777  014000  004744            BIS     #14000,@RPCS    ;10/15 MODE HEADER OP
  843  002032  112777  000005  004736            MOVB    #5,@RPCS        ;READ
  844  002040  032777  100200  004730            BIT     #B15+B7,@RPCS   ;ERROR OR DONE?
  845  002046  001774                            BEQ     .-6             ;NOT YET
  846  002050  100002                            BPL     HG02            ;DONE
  847  002052  104074                            ERR+ER+DS+CS+DA         ;ERROR ON READING NEW HEADER
  848  002054  000742                            BR      HGL2            ;TRY AGAIN
  849  002056  012704  007252          HG02:     MOV     #INBUF,R4       ;R4=DATA POINTER
  850  002062  004767  001376                    JSR     PC,CHKAD        ;CHECK REWRITTEN HEADER
  851  002066  000735                            BR      HGL2            ;ERROR - TRY AGAIN
  852  002070                                    PNTM    ENDM1
  853  002070  012700  006411                    MOV     #ENDM1,R0               ;PRINT MESSAGE
  854  002074  004767  004534                    JSR     PC,TYPOUT       ;POINTED TO BY ENDM1
  855  002100  000000                            HALT
  856
  857
  858
  859
  860
```

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                                        .SBTTL  ** SPECIAL FORMATTER **
                                        ;THIS ROUTINE WILL FORMAT THE ENTIRE PACK USING THE SECTOR
                                        ;ADDRESS SEQUENCE SPECIFIED BY THE OPERATOR. THE STARTING
                                        ;ADDRESS IS 300.
002102  012706  000600          START3: MOV     #START1,SP      ;SET STACK
002106  012767  000340  175662          MOV     #P7,CC          ;LOCKOUT PI
002114  000005                          RESET                   ;CLEAR
002116  004767  001012                  JSR     PC,UNIQ         ;GET UNIT#
002122                          SFSL1:  PNTM    SECMES
002122  012700  004031                  MOV     #SECMES,R0              ;PRINT MESSAGE
002126  004767  004502                  JSR     PC,TYPOUT       ;POINTED TO BY SECMES
002132  004767  000452                  JSR     PC,CLRS         ;CLEAR FLAG STRING
002136  012767  177766  004542          MOV     #-10.,TOG1      ;DO BELOW 10 TIMES
002144  012705  003052                  MOV     #NSTR,R5        ;POINTER TO MESSAGE POINTERS
002150  012704  003076                  MOV     #SCSLT,R4
002154  012500                  SFSL2:  MOV     (R5)+,R0        ;FETCH POINTER
002156  004767  004452                  JSR     PC,TYPOUT       ;FOR MESSAGE
002162  004767  000442                  JSR     PC,SIN          ;GET PARAMETER
002166  000755                          BR      SFSL1           ;ERROR
002170  005267  004512                  INC     TOG1            ;DONE?
002174  001367                          BNE     SFSL2           ;NOT YET
002176  004767  000476          SFSL3:  JSR     PC,MKBUF        ;GENERATE A TABLE OF ADDRESSES
002202  116777  004520  004570          MOVB    UNIT,@RPCS1     ;RESET
002210  004767  001120                  JSR     PC,HOME         ;SELECTED UNIT
002214  005067  004512                  CLR     CYL             ;START AT CYL=0
002220  016777  004506  004560  SFSL4:  MOV     CYL,@RPCA       ;LOAD
002226  005077  004560                  CLR     @RPDA           ;DISK ADDRESS
002232  004767  000540                  JSR     PC,SEKE         ;SEEK
002236  000757                          BR      SFSL3           ;ERROR RETURN
002240  012777  176650  004534          MOV     #-600.,@RPWC    ;GOOD RETURN
002246  012777  011552  004530          MOV     #OUTBUF,@RPBA   ;WC&CA
002254  052777  014000  004514          BIS     #14000,@RPCS    ;10/15 HEADER MODE
002262  112777  000003  004506          MOVB    #3,@RPCS        ;WRITE
002270  032777  100200  004500          BIT     #B15+B7,@RPCS   ;ERROR OR DONE
002276  001774                          BEQ     .-6             ;WAIT
002300  100002                          BPL     SFSN1           ;DONE
002302  104074                          ERR+ER+DS+CS+DA         ;ERROR ON WRITE HEADER OP
002304  000745                          BR      SFSL4           ;REPEAT
002306  012767  177470  004372  SFSN1:  MOV     #-200.,TOG1
002314  012705  011554                  MOV     #OUTBUF+2,R5
002320  062715  000100          SFSL5:  ADD     #100,(R5)       ;ADVANCE CYLINDER ADDRESS
002324  062705  000006                  ADD     #6,R5           ;INDEX
002330  005267  004352                  INC     TOG1            ;DONE?
002334  001371                          BNE     SFSL5           ;NO
002336  005267  004370                  INC     CYL             ;ADVANCE CYLINDER
002342  026727  004364  000625          CMP     CYL,#405.       ;DONE?
002350  101001                          BHI     SFCHK           ;YES
002352  000722                          BR      SFSL4           ;NO
002354  012767  000340  175414  SFCHK:  MOV     #P7,PS          ;LOCKOUT PI
002362  116777  004340  004410          MOVB    UNIT,@RPCS1     ;SET UNIT
002370  004767  000740                  JSR     PC,HOME         ;HOME SEEK
002374  005067  004332                  CLR     CYL             ;CYL=0
002400  016777  004326  004400  SFCL1:  MOV     CYL,@RPCA       ;TAR=0
002406  005077  004400                  CLR     @RPDA           ;SAR=0
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  917  002412  004767  000360                    JSR     PC,SEKE         ;SEEK
  918  002416  000756                            BR      SFCHK           ;ERROR RETURN
  919  002420  012777  176650  004354            MOV     #-600.,@RPWC    ;WC
  920  002426  012777  007252  004350            MOV     #INBUF,@RPBA    ;CA
  921
  922  002434  052777  014000  004334            BIS     #14000,@RPCS    ;10/15 HEADER OP
  923  002442  112777  000005  004326            MOVB    #5,@RPCS                ;READ
  924  002450  032777  100200  004320            BIT     #B15+B7,@RPCS   ;ERROR OR DONE?
  925  002456  001774                            BEQ     .-6             ;NOT YET
  926  002460  100002                            BPL     SFCN1           ;JUMP IF DONE
  927  002462  104074                            ERR+ER+DS+CS+DA         ;READ HEADER ERROR
  928  002464  000745                            BR      SFCL1           ;LOOP
  929  002466  012705  003076          SFCN1:    MOV     #SCSLT,R5       ;SETUP SECTOR LIST AND
  930  002472  012767  177766  004206            MOV     #-10.,TOG1      ;COUNTER
  931  002500  005067  004230                    CLR     HED             ;SETUP GOOD DATA
  932  002504  012704  007252                    MOV     #INBUF,R4       ;SETUP BUFFER POINTER
  933  002510  012567  004222          SFCL2:    MOV     (R5)+,SEC       ;FETCH A SECTOR
  934  002514  004767  000744                    JSR     PC,CHKAD        ;CHECK ADDRESS
  935  002520  000240                            NOP                     ;NO LOOPING
  936  002522  005267  004160                    INC     TOG1            ;DONE ONE SURFACE?
  937  002526  001370                            BNE     SFCL2           ;NO
  938  002530  012705  003076                    MOV     #SCSLT,R5       ;YES - RESET
  939  002534  012767  177766  004144            MOV     #-10.,TOG1      ;SECTOR PARAMETERS
  940  002542  005267  004166                    INC     HED             ;ADVANCE TRACK
  941  002546  026727  004162  000023            CMP     HED,#19.        ;DONE?
  942  002554  101755                            BLOS    SFCL2           ;NO
  943  002556  005067  004152                    CLR     HED             ;YES - RESET HEAD
  944  002562  005267  004144                    INC     CYL             ;ADVANCE CYLINDER
  945  002566  026727  004140  000625            CMP     CYL,#405.       ;DONE?
  946  002574  101701                            BLOS    SFCL1           ;NOT YET
  947  002576                                    PNTM    ENDM1
  948  002576  012700  006411                    MOV     #ENDM1,R0               ;PRINT MESSAGE
  949  002602  004767  004026                    JSR     PC,TYPOUT       ;POINTED TO BY ENDM1
  950  002606  000000                            HALT
  951  002610  012705  177742          CLRS:     MOV     #-30.,R5        ;CLEAR
  952  002614  012704  003076                    MOV     #SCSLT,R4       ;THE SECTOR
  953  002620  105024                  CLRS1:    CLRB    (R4)+           ;SLOTS AND
  954  002622  005205                            INC     R5              ;FLAG POINTERS
  955  002624  001375                            BNE     CLRS1           ;EXIT
  956  002626  000207                            RTS     PC              ;WHEN DONE
  957  002630  004767  001140          SIN:      JSR     PC,RIN          ;ASSEMBLE
  958  002634  004767  003662                    JSR     PC,TTO          ;ECHO
  959  002640  162700  000260                    SUB     #260,R0         ;A LIST OF
  960  002644  020027  000011                    CMP     R0,#9.          ;LOGICAL SECTOR
  961  002650  101012                            BHI     SIN1            ;NUMBERS
  962  002652  005700                            TST     R0              ;TOO SMALL?
  963  002654  100410                            BMI     SIN1            ;0-9 ARE LEGAL
  964  002656  105760  003122                    TSTB    SCFLG(R0)       ;HAS THIS NUMBER BEEN USED?
  965  002662  001005                            BNE     SIN1            ;ERROR - THIS NUMBER ALREADY USED
  966  002664  105160  003122                    COMB    SCFLG(R0)       ;SET FLAG
  967  002670  010024                            MOV     R0,(R4)+        ;STORE SEC#
  968  002672  062716  000002                    ADD     #2,(SP)         ;ADVANCE RETURN
  969  002676  000207                  SIN1:     RTS     PC              ;AND EXIT
  970  002700  012767  177754  004000  MKBUF:    MOV     #-20.,TOG1      ;TOG1=COUNTER
  971  002706  012705  011552                    MOV     #OUTBUF,R5      ;R5=POINTER TO BUFFER
  972  002712  012704  003076                    MOV     #SCSLT,R4       ;R4=POINTER TO SECTOR LIST
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  973  002716  012767  177766  003764          MOV     #-10.,TOG2      ;TOG2=SECTOR COUNT
  974  002724  005067  003766                  CLR     WORK
  975  002730  005025                  MKBL1:  CLR     (R5)+           ;WORD1=0
  976  002732  016725  003760                  MOV     WORK,(R5)+      ;WORK2=CYL+HEAD
  977  002736  012425                  MOV     (R4)+,(R5)+     ;WORD3=SECTOR
  978  002740  005267  003744                  INC     TOG2            ;DONE 10?
  979  002744  001371                  BNE     MKBL1           ;NO
  980
  981  002746  012704  003076                  MOV     #SCSLT,R4       ;YES - UPDATE POINTER,
  982  002752  012767  177766  003730          MOV     #-10.,TOG2      ;COUNTER,
  983  002760  062767  000002  003730          ADD     #2,WORK         ;AND TRACK
  984  002766  005267  003714                  INC     TOG1            ;FINISHED?
  985  002772  001356                  BNE     MKBL1           ;NO
  986  002774  000207                  RTS     PC              ;EXIT
  987  002776  112777  000377  003762  SEKE:   MOVB    #377,@RPDS      ;CLEAR ATTN
  988  003004  112777  000011  003764          MOVB    #11,@RPCS       ;SEEK
  989  003012  036777  003712  003746          BIT     ATNB,@RPDS      ;WAIT FOR
  990  003020  001774                  BEQ     .-6             ;ATTN
  991  003022  112777  000377  003736          MOVB    #377,@RPDS      ;CLEAR ATTN
  992  003030  032777  004000  003730          BIT     #B11,@RPDS      ;DONE?
  993  003036  001402                  BEQ     .+6
  994  003040  104474                  ERM+ER+CS+DS+DA         ;SEEK INCOMPLETE
  995  003042  000207                  RTS     PC              ;ERROR EXIT
  996  003044  062716  000002                  ADD     #2,(SP)         ;GOOD
  997  003050  000207                  RTS     PC              ;EXIT
  998  003052  004117                  NSTR:   NO
  999  003054  004124                          N1
 1000  003056  004131                          N2
 1001  003060  004136                          N3
 1002  003062  004143                          N4
 1003  003064  004150                          N5
 1004  003066  004155                          N6
 1005  003070  004162                          N7
 1006  003072  004167                          N8
 1007  003074  004174                          N9
 1008  003076                          SCSLT:  .REPT   12
 1009                                          .WORD   0
 1010                                          .ENDR
 1011  003076  000000                          .WORD   0
 1012  003100  000000                          .WORD   0
 1013  003102  000000                          .WORD   0
 1014  003104  000000                          .WORD   0
 1015  003106  000000                          .WORD   0
 1016  003110  000000                          .WORD   0
 1017  003112  000000                          .WORD   0
 1018  003114  000000                          .WORD   0
 1019  003116  000000                          .WORD   0
 1020  003120  000000                          .WORD   0
 1021
 1022  003122                          SCFLG:  .REPT   12
 1023                                          .BYTE   0
 1024                                          .ENDR
 1025  003122      000                         .BYTE   0
 1026  003123      000                         .BYTE   0
 1027  003124      000                         .BYTE   0
 1028  003125      000                         .BYTE   0
```

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1029  003126  000                          .BYTE   0
1030  003127  000                          .BYTE   0
1031  003130  000                          .BYTE   0
1032  003131  000                          .BYTE   0
1033  003132  000                          .BYTE   0
1034  003133  000                          .BYTE   0
1035
1036
1037
1038  003134                       UNIQ:   PNTM    UMES
1039  003134  012700  004020               MOV     #UMES,R0            ;PRINT MESSAGE
1040  003140  004767  003470               JSR     PC,TYPOUT           ;POINTED TO BY UMES
1041  003144  004767  000504               JSR     PC,TTIO             ;READ UNIT #
1042  003150  000771                       BR      UNIQ                ;ERROR RECYCLE
1043  003152  020027  000007               CMP     R0,#7               ;TOO BIG
1044  003156  101366                       BHI     UNIQ                ;YES
1045  003160  010067  003542               MOV     R0,UNIT             ;SAVE IT
1046  003164  012700  000001               MOV     #1,R0               ;DETERMINE ATTENTION BIT
1047  003170  005767  003532               TST     UNIT                ;NO  ROTATION
1048  003174  001406                       BEQ     UNS1                ;IF 0
1049  003176  016767  003524  000004       MOV     UNIT,DS1            ;NUMBER OF ROTATES
1050  003204  004767  001426               JSR     PC,RTL              ;TO DETERMINE ATTENTION BIT
1051  003210  000001               DS1:    .WORD   1                   ;IS PUT HERE
1052  003212  010067  003512       UNS1:   MOV     R0,ATNB             ;SAVE BIT
1053  003216  116777  003504  003554       MOVB    UNIT,@RPCS1         ;SELECT UNIT
1054  003224  032777  100000  003534       BIT     #B15,@RPDS          ;IS IT READY?
1055  003232  001401                       BEQ     .+4                 ;NO
1056  003234  000207                       RTS     PC                  ;YES - EXIT
1057  003236  104434                       ERM+DS+ER+CS                ;SELECTED UNIT READY NOT UP
1058  003240  000766                       BR      UNS1+4              ;LOOP UNTIL FIXED
1059  003242                       SPACE:  PNTM    S1
1060  003242  012700  006160               MOV     #S1,R0              ;PRINT MESSAGE
1061  003246  004767  003362               JSR     PC,TYPOUT           ;POINTED TO BY S1
1062  003252  005367  003476               DEC     TTG                 ;PRINT NUMBER OF SPACES
1063  003256  001371                       BNE     SPACE               ;IN TTG. THEN
1064  003260  000207                       RTS     PC                  ;EXIT
1065  003262  004767  000266       PARIN:  JSR     PC,TTIO             ;READ SOME NUMBERS
1066  003266  000401                       BR      .+4                 ;THIS IS NOW THE GOOD RETURN
1067  003270  000207                       RTS     PC                  ;CR IS ILLEGAL FOR THIS SEQUENCE
1068  003272  020027  000240               CMP     R0,#240             ;IS IT A SPACE?
1069  003276  001015                       BNE     PRX                 ;NO - EXIT
1070  003300  026705  003414               CMP     WORK1,R5            ;TOO BIG?
1071  003304  101012                       BHI     PRX                 ;YES - EXIT
1072  003306  005267  003442               INC     TTG                 ;TTG=# OF SPACES
1073  003312  026727  003436  000005       CMP     TTG,#5              ;TOO MANY
1074  003320  101004                       BHI     PRX                 ;YES
1075  003322  004767  177714               JSR     PC,SPACE            ;JUSTIFY NEXT ENTRY
1076  003326  062716  000002               ADD     #2,(SP)             ;SKIP FOR GOOD RETURN
1077  003332  000207               PRX:    RTS     PC                  ;EXIT
1078
1079  003334  112777  000377  003424 HOME:  MOVB    #377,@RPDS          ;CLEAR ATTN BITS
1080  003342  112777  000015  003426       MOVB    #15,@RPCS           ;HOME SEEK
1081  003350  012767  000005  003670       MOV     #5,DEBUG+174        ;WAIT FOR
1082  003356  005367  003664       WWW:    DEC     DEBUG+174           ;SEEK TO
1083  003362  001375                       BNE     WWW                 ;START
1084  003364  032777  002000  003374       BIT     #B10,@RPDS          ;IS SEEK UNDERWAY?
```

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1085  003372  001002                          BNE     .+6             ;YES
1086  003374  104434                          ERM+ER+DS+CS            ;SEEK NOT UNDERWAY
1087  003376  000756                          BR      HOME            ;FIX IT
1088  003400  036777  003324  003360          BIT     ATNB,@RPDS      ;WAIT FOR
1089  003406  001774                          BEQ     .-6             ;ATTENTION TO SET
1090  003410  032777  004000  003350          BIT     #B11,@RPDS      ;SEEK INCOMPLETE?
1091  003416  001402                          BEQ     .+6             ;NO
1092  003420  104434                          ERM+ER+DS+CS            ;DEVICE STATUS ERROR
1093  003422  000744                          BR      HOME            ;LOOP
1094  003424  132777  000023  003336          BITB    #23,@RPDS1      ;ANY ERRORS?
1095  003432  001402                          BEQ     .+6             ;NO
1096  003434  104434                          ERM+ER+CS+DS            ;DEVICE STATUS ERROR
1097  003436  000736                          BR      HOME            ;LOOP
1098  003440  112777  000001  003330          MOVB    #1,@RPCS        ;RESET THE RP11
1099  003446  112777  000377  003312          MOVB    #377,@RPDS      ;CLEAR ATTN BITS
1100  003454  116777  003246  003316          MOVB    UNIT,@RPCS1     ;RELOAD UNIT#
1101  003462  000207                          RTS     PC              ;EXIT
1102  003464  062704  000002          CHKAD:  ADD     #2,R4           ;SKIP 1ST WORD
1103  003470  012467  003246                  MOV     (R4)+,HEDR      ;FETCH HEAD AND
1104  003474  013767  003242  003236          MOV     HEDR,CYLR       ;CYLINDER READ
1105  003502  006067  003234                  ROR     HEDR            ;JUSTIFY HEAD
1106  003506  006067  003226                  ROR     CYLR
1107  003512  006067  003222                  ROR     CYLR
1108  003516  006067  003216                  ROR     CYLR
1109  003522  006067  003212                  ROR     CYLR
1110  003526  006067  003206                  ROR     CYLR
1111  003532  006067  003202                  ROR     CYLR
1112  003536  012467  003202                  MOV     (R4)+,SECR      ;FETCH SECTOR READ
1113  003542                                  ANDI    17,SECR
1114  003542  042767  177760  003174          BIC     #-17-1,SECR     ;MASK 17 APPLIED TO SECR
1115  003550                                  ANDI    37,HEDR
1116  003550  042767  177740  003164          BIC     #-37-1,HEDR     ;MASK 37 APPLIED TO HEDR
1117  003556                                  ANDI    777,CYLR
1118  003556  042767  177000  003154          BIC     #-777-1,CYLR    ;MASK 777 APPLIED TO CYLR
1119  003564  026767  003142  003146          CMP     CYL,CYLR        ;IS CYL# OK?
1120  003572  001013                          BNE     CMER            ;NO
1121  003574  026767  003134  003140          CMP     HED,HEDR        ;IS TRACK# OK
1122  003602  001007                          BNE     CMER            ;NO
1123  003604  026767  003126  003132          CMP     SEC,SECR        ;IS SECTOR# OK?
1124  003612  001003                          BNE     CMER            ;NO
1125  003614  062716  000002                  ADD     #2,(SP)         ;ALL ADDRESSES
1126  003620  000207                          RTS     PC              ;OK - EXIT
1127  003622  104500                  CMER:   ERM+HD                  ;HEADER COMPARE ERROR
1128  003624  000207                          RTS     PC              ;ERROR EXIT
1129  003626                          SUBER:  PNTM    SUBRMS
1130  003626  012700  006241                  MOV     #SUBRMS,R0              ;PRINT MESSAGE
1131  003632  004767  002776                  JSR     PC,TYPOUT       ;POINTED TO BY SUBRMS
1132  003636  016600  000022                  MOV     22(SP),R0       ;FETCH PC OF SUBROUTINE CALL
1133  003642  162700  000004                  SUB     #4,R0           ;PC-4=ADDRESS OF SUBROUTINE CALL
1134  003646  004767  002620                  JSR     PC,OCTPNT       ;PRINT ADDRESS
1135  003652  000207                          RTS     PC              ;EXIT
1136
1137  003654  012767  000005  003072  TTIO:   MOV     #5,TTG          ;INPUT UP TO 5 OCTAL DIGITS
1138  003662  005067  003032                  CLR     WORK1           ;CLEAR WORK REGISTER
1139  003666  004767  000102          TTIL:   JSR     PC,RIN          ;READ TTY CHARACTER INTO R0
1140  003672  020027  000215                  CMP     R0,#215         ;IS IT CR?
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1141  003676  001427                          BEQ     TTIX            ;YES
1142  003700  004767  002616                  JSR     PC,TTO          ;ECHO
1143  003704  020027  000267                  CMP     R0,#267         ;TOO BIG?
1144  003710  101030                          BHI     TTRX            ;YES
1145  003712  020027  000257                  CMP     R0,#257         ;TOO SMALL?
1146  003716  101425                          BLOS    TTRX            ;YES
1147  003720  005367  003030                  DEC     TTG             ;COUNT DIGIT
1148  003724  100422                          BMI     TTRX            ;TOO MANY?
1149  003726                                  ANDI    7,R0            ;NO - MASK IT
1150  003726  042700  177770                  BIC     #-7-1,R0        ;MASK 7 APPLIED TO R0
1151  003732  000241                          CLC                     ;AND
1152  003734  006167  002760                  ROL     WORK1           ;SHIFT
1153  003740  006167  002754                  ROL     WORK1           ;WORK REGISTER
1154  003744  006167  002750                  ROL     WORK1           ;3 PLACES
1155  003750  060067  002744                  ADD     R0,WORK1        ;ADD NEW NUMBER
1156  003754  000744                          BR      TTIL            ;GET NEXT ONE
1157  003756  004767  002540          TTIX:   JSR     PC,TTO
1158  003762  062716  000002                  ADD     #2,(SP)         ;SKIP RETURN
1159  003766  016700  002726                  MOV     WORK1,R0
1160  003772  000207                  TTRX:   RTS     PC
1161  003774  005267  173560          RIN:    INC     TKS             ;FETCH A CHARACTER
1162  004000  105767  173554                  TSTB    TKS             ;WAIT
1163  004004  100375                          BPL     .-4             ;FOR IT
1164  004006  116700  173550                  MOVB    TKB,R0          ;READ IT INTO R0
1165  004012                                  ANDI    377,R0
1166  004012  042700  177400                  BIC     #-377-1,R0      ;MASK 377 APPLIED TO R0
1167  004016  000207                          RTS     PC              ;AND EXIT
1168
1169
1170
1171  004020  023046  047125  052111  UMES:   .ASCII  /&&UNIT: @/
1172  004026  020072     100
1173  004031     046  044446  050116  SECMES: .ASCII  /&&INPUT THE SECTOR NUMBERS(0-9) IN THE ORDER DESIRED.@/
1174  004036  052125  052040  042510
1175  004044  051440  041505  047524
1176  004052  020122  052516  041115
1177  004060  051105  024123  026460
1178  004066  024471  044440  020116
1179  004074  044124  020105  051117
1180  004102  042504  020122  042504
1181  004110  044523  042522  027104
1182  004116     100
1183  004117     046  035060  040040  N0:     .ASCII  /&0: @/
1184  004124  030446  020072     100  N1:     .ASCII  /&1: @/
1185  004131     046  035062  040040  N2:     .ASCII  /&2: @/
1186  004136  031446  020072     100  N3:     .ASCII  /&3: @/
1187  004143     046  035064  040040  N4:     .ASCII  /&4: @/
1188  004150  032446  020072     100  N5:     .ASCII  /&5: @/
1189  004155     046  035066  040040  N6:     .ASCII  /&6: @/
1190  004162  033446  020072     100  N7:     .ASCII  /&7: @/
1191  004167     046  035070  040040  N8:     .ASCII  /&8: @/
1192  004174  034446  020072     100  N9:     .ASCII  /&9: @/
1193
1194  004201     046  051446  052105  SWMES:  .ASCII  /&&SET THE FORMAT ENABLE SWITCH./
1195  004206  052040  042510  043040
1196  004214  051117  040515  020124
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 1197  004222  047105  041101  042514
 1198  004230  051440  044527  041524
 1199  004236  027110
 1200  004240  051446  052105  052040          .ASCII  /&SET THE RP11 WRITE ENABLE SWITCH./
 1201  004246  042510  051040  030520
 1202  004254  020061  051127  052111
 1203  004262  020105  047105  041101
 1204  004270  042514  051440  044527
 1205  004276  041524  027110
 1206  004302  051446  052105  052040          .ASCII  /&SET THE SELECTED UNIT WRITE ENABLE SWITCH./
 1207  004310  042510  051440  046105
 1208  004316  041505  042524  020104
 1209  004324  047125  052111  053440
 1210  004332  044522  042524  042440
 1211  004340  040516  046102  020105
 1212  004346  053523  052111  044103
 1213  004354     056
 1214  004355     046  052123  044522          .ASCII  /&STRIKE ANY TELETYPE KEY WHEN READY.&@/
 1215  004362  042513  040440  054516
 1216  004370  052040  046105  052105
 1217  004376  050131  020105  042513
 1218  004404  020131  044127  047105
 1219  004412  051040  040505  054504
 1220  004420  023056     100
 1221
 1222  004423     046  051046  051505  NSWMES: .ASCII  /&&RESET THE FORMAT ENABLE SWITCH TO NORMAL./
 1223  004430  052105  052040  042510
 1224  004436  043040  051117  040515
 1225  004444  020124  047105  041101
 1226  004452  042514  051440  044527
 1227  004460  041524  020110  047524
 1228  004466  047040  051117  040515
 1229  004474  027114
 1230  004476  051446  051124  045511          .ASCII  /&STRIKE ANY TELETYPE KEY WHEN READY.&@/
 1231  004504  020105  047101  020131
 1232  004512  042524  042514  054524
 1233  004520  042520  045440  054505
 1234  004526  053440  042510  020116
 1235  004534  042522  042101  027131
 1236  004542  040046
 1237
 1238                                          .EVEN
 1239
 1240  004544  032777  040000  002224  HRDER:  BIT     #B14,@RPCS      ;TEST HARD ERROR BIT
 1241  004552  001001                          BNE     HRN1            ;OK IF SET
 1242  004554  104020                          ERR+CS                  ;HARD ERROR NOT SET. C(SP) POINTS TO CAUSE
 1243  004556  032777  100000  002212  HRN1:   BIT     #B15,@RPCS      ;TEST ERROR BIT IN RPCS
 1244  004564  001401                          BEQ     .+4             ;OK IF SET
 1245  004566  000207                          RTS     PC              ;OK- EXIT
 1246  004570  104020                          ERR+CS                  ;RPCS ERROR NOT SET. C(SP) POINTS TO CAUSE
 1247  004572  000207                          RTS     PC              ;EXIT
 1248  004574  032777  040000  002174  SFTER:  BIT     #B14,@RPCS      ;TEST HARD ERROR BIT
 1249  004602  001765                          BEQ     HRN1            ;OK IF CLEAR
 1250  004604  104020                          ERR+CS                  ;SOFT ERROR SET HARD ERROR BIT
 1251  004606  000763                          BR      HRN1            ;TEST INCLUSIVE ERROR
 1252  004610  017667  000000  002144  RTR:    MOV     @(SP),ROTOG     ;FETCH SHIFT COUNT
```

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1253  004616  062716  000002                 ADD     #2,(SP)          ;STEP RETURN VECTOR
1254  004622  000241                 RRLUP:  CLC                      ;CLEAR THE LINK
1255  004624  006000                         ROR     R0               ;SHIFT R0 RIGHT ONCE
1256  004626  005367  002130                 DEC     ROTOG            ;FINISHED?
1257  004632  001373                         BNE     RRLUP            ;NO
1258  004634  000207                         RTS     PC               ;YES- EXIT
1259  004636  017667  000000  002116 RTL:    MOV     @(SP),ROTOG      ;FETCH SHIFT COUNT
1260  004644  062716  000002                 ADD     #2,(SP)          ;STEP RETURN VECTOR
1261  004650  000241                 RLLUP:  CLC                      ;CLEAR LINK
1262  004652  006100                         ROL     R0               ;SHIFT R0 LEFT ONCE
1263  004654  005367  002102                 DEC     ROTOG            ;FINISHED?
1264  004660  001373                         BNE     RLLUP            ;NO
1265  004662  000207                         RTS     PC               ;YES- EXIT
1266
1267
1268  004664  032767  002000  172676 ERROR:  BIT     #B10,SR          ;RING THE BELL?
1269  004672  001404                         BEQ     1$               ;BRANCH IF NO
1270  004674                                 PNTM    BELL
1271  004674  012700  006430                 MOV     #BELL,R0                 ;PRINT MESSAGE
1272  004700  004767  001730                 JSR     PC,TYPOUT        ;POINTED TO BY BELL
1273  004704  032767  020000  172656 1$:     BIT     #B13,SR          ;TEST TTO DELETE SWITCH
1274  004712  001103                         BNE     ERXIT1           ;EXIT NOW IF TTO DELETE SWITCH IS UP
1275  004714  004567  001512                 JSR     R5,SAV05         ;SAVE AC0-5
1276  004720  012700  006167                 MOV     #ERMS1,R0        ;MESSAGE POINTER TO K0
1277  004724  004767  001704                 JSR     PC,TYPOUT        ;PRINT MESSAGE
1278  004730  016600  000014                 MOV     14(SP),R0        ;FETCH SAVED PC
1279  004734  162700  000002                 SUB     #2,R0            ;FIND ADDRESS OF ERROR CALL
1280  004740  010005                         MOV     R0,R5            ;PUT POINTER IN R5
1281  004742  004767  001524                 JSR     PC,OCTPNT        ;PRINT PC
1282  004746  012700  006372                 MOV     #STMS,R0         ;MESSAGE POINTER
1283  004752  004767  001656                 JSR     PC,TYPOUT        ;PRINT "PS="
1284  004756  016600  000016                 MOV     16(SP),R0        ;FETCH SAVED STATUS
1285  004762  004767  001504                 JSR     PC,OCTPNT        ;AND PRINT IT
1286  004766  032715  000400                 BIT     #B8,(R5)         ;TRAP?
1287  004772  001402                         BEQ     GOGO             ;NO
1288  004774  004767  176626                 JSR     PC,SUBER         ;SUBROUTINE ERROR
1289  005000  032715  000020         GOGO:   BIT     #B4,(R5)         ;RPCS?
1290  005004  001402                         BEQ     .+6              ;NO
1291  005006  004767  000230                 JSR     PC,CSTYPE        ;YES
1292  005012  032715  000010                 BIT     #B3,(R5)         ;RPER?
1293  005016  001402                         BEQ     .+6              ;NO
1294  005020  004767  000262                 JSR     PC,ERTYPE        ;YES
1295  005024  032715  000004                 BIT     #B2,(R5)         ;RPDS?
1296  005030  001402                         BEQ     .+6              ;NO
1297  005032  004767  000272                 JSR     PC,DSTYPE        ;YES
1298  005036  032715  000040                 BIT     #B5,(R5)         ;RPDA & RPCA?
1299  005042  001402                         BEQ     .+6              ;NO
1300  005044  004767  000302                 JSR     PC,ADTYPE        ;YES
1301  005050  032715  000100                 BIT     #HD,(R5)         ;HEADER MESSAGE?
1302  005054  001402                         BEQ     .+6              ;NO
1303  005056  004767  000616                 JSR     PC,HDTYPE        ;YES
1304  005062  032715  000001                 BIT     #B0,(R5)         ;B0(1) FOR GOOD/BAD
1305  005066  001402                         BEQ     .+6              ;SKIP IF=0
1306  005070  004767  000104                 JSR     PC,GBTYPE        ;GOOD/BAD
1307  005074  032715  000002                 BIT     #B1,(R5)         ;B1(1) FOR DATA
1308  005100  001402                         BEQ     .+6              ;SKIP IF=0
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1309  005102  004767  000156                JSR     PC,DATYPE       ;DATA
1310  005106  004567  001334          ERXIT: JSR     R5,RESTO5       ;RESTORE AC0-5
1311  005112  012700  000015                MOV     #CR,R0          ;PRINT
1312  005116  004767  001400                JSR     PC,TTO          ;CR & LF
1313  005122  105777  001650          ERXIT1:TSTB    @RPCS           ;WAIT FOR DONE
1314  005126  100375                        BPL     ERXIT1
1315  005130  032767  100000  172432        BIT     #B15,SR         ;HALT ON ERROR?
1316  005136  001401                        BEQ     1$
1317  005140  000000                        XX                      ;ERROR HALT. CONTINUE
1318  005142  000002                1$:     RTI                     ;EXIT ERROR ROUTINE
1319
1320
1321
1322  005144  032767  020000  172416 LERCHK: BIT     #B13,SR         ;SR13(1)=LOOP ON ERROR
1323  005152  001002                        BNE     .+6             ;EXIT IF 1
1324  005154  062716  000004                ADD     #4,(SP)         ;ADVANCE RETURN VECTOR OVER LOOP JUMP
1325  005160  000207                LERXT:  RTS     PC              ;EXIT
1326
1327  005162  032767  010000  172400 LUPCHK: BIT     #B12,SR         ;SR12(1)=LOOP ALWAYS
1328  005170  001002                        BNE     .+6             ;EXIT IF 1
1329  005172  062716  000004                ADD     #4,(SP)         ;ADVANCE RETURN VECTOR OVER LOOP JUMP
1330  005176  000207                        RTS     PC              ;EXIT
1331
1332  005200  012700  006354          GBTYPE: MOV     #GDMS,R0        ;POINTER TO "GOOD"
1333  005204  004767  001424                JSR     PC,TYPOUT       ;PRINT MESSAGE
1334  005210  016700  001462                MOV     GOOD,R0         ;FETCH C(GOOD)
1335  005214  004767  000354                JSR     PC,PNTOCT       ;PRINT OCTAL NUMBER
1336  005220  012700  006364                MOV     #BDMS,R0        ;POINTER TO "BAD"
1337  005224  004767  001404                JSR     PC,TYPOUT       ;PRINT MESSAGE
1338  005230  016700  001444                MOV     BAD,R0          ;FETCH C(BAD)
1339  005234  004767  000334                JSR     PC,PNTOCT       ;PRINT OCTAL NUMBER
1340  005240  000207                        RTS     PC              ;EXIT
1341
1342  005242  012700  006275          CSTYPE: MOV     #CSMS,R0        ;POINTER TO "STATUS"
1343  005246  004767  001362                JSR     PC,TYPOUT       ;PRINT TEXT
1344  005252  017700  001520                MOV     @RPCS,R0        ;FETCH C(RPCS)
1345  005256  004767  000312                JSR     PC,PNTOCT       ;PRINT OCTAL NUMBER
1346  005262  000207                        RTS     PC              ;EXIT
1347  005264  012700  006401          DATYPE: MOV     #DAMS,R0        ;POINTER TO "DATA"
1348  005270  004767  001340                JSR     PC,TYPOUT       ;PRINT TEST
1349  005274  016700  001402                MOV     DATA,R0         ;FETCH C(DATA)
1350  005300  004767  000270                JSR     PC,PNTOCT       ;PRINT OCTAL NUMBER
1351  005304  000207                        RTS     PC              ;EXIT
1352  005306  012700  006305          ERTYPE: MOV     #ERMS,R0        ;PRINT
1353  005312  004767  001316                JSR     PC,TYPOUT       ;"RPER="
1354  005316  017700  001450                MOV     @RPER,R0        ;PRINT
1355  005322  004767  000246                JSR     PC,PNTOCT       ;RPER
1356  005326  000207                        RTS     PC              ;EXIT
1357  005330  012700  006315          DSTYPE: MOV     #DSMS,R0        ;PRINT
1358  005334  004767  001274                JSR     PC,TYPOUT       ;"RPDS="
1359  005340  017700  001422                MOV     @RPDS,R0        ;PRINT
1360  005344  004767  000224                JSR     PC,PNTOCT       ;RPDS
1361  005350  000207                        RTS     PC              ;EXIT
1362  005352  032777  000001  001412 ADTYPE: BIT     #B0,@RPER       ;ADDRESS ERROR?
1363  005360  001407                        BEQ     1$              ;BRANCH IF NO
1364  005362  017767  001420  001334        MOV     @RPCA,WORK3     ;GET THE CLYINDER ADDREEE
```

```
1365  005370  017767  001416  001324          MOV     @RPDA,WORK2     ;GET HEAD AND SECTOR ADDRESS
1366  005376  000437                          BR      ADT1
1367  005400  017767  001402  001316  1$:     MOV     @RPCA,WORK3
1368  005406  017767  001400  001306          MOV     @RPDA,WORK2
1369  005414  042767  160360  001300          BIC     #160360,WORK2
1370  005422  032767  000017  001272          BIT     #17,WORK2
1371  005430  001403                          BEQ     DECTK
1372  005432  005367  001264                  DEC     WORK2
1373  005436  000417                          BR      ADT1
1374  005440  132767  000037  001255  DECTK:  BITB    #37,WORK2+1
1375  005446  001406                          BEQ     DECCY
1376  005450  105367  001247                  DECB    WORK2+1
1377  005454  052767  000011  001240          BIS     #11,WORK2
1378  005462  000405                          BR      ADT1
1379  005464  012767  011411  001230  DECCY:  MOV     #11411,WORK2
1380  005472  005367  001226                  DEC     WORK3
1381  005476  012700  006325          ADT1:   MOV     #CYMS,R0        ;PRINT
1382  005502  004767  001126                  JSR     PC,TYPOUT       ;"CAR="
1383  005506  016700  001212                  MOV     WORK3,R0        ;PRINT
1384  005512                                  ANDI    777,R0
1385  005512  042700  177000                  BIC     #-777-1,R0      ;MASK 777 APPLIED TO R0
1386  005516  004767  000750                  JSR     PC,OCTPNT       ;CAR
1387  005522  012700  006334                  MOV     #TAMS,R0        ;PRINT
1388  005526  004767  001102                  JSR     PC,TYPOUT       ;"TAR="
1389  005532  116700  001165                  MOVB    WORK2+1,R0      ;PRINT
1390  005536                                  ANDI    37,R0
1391  005536  042700  177740                  BIC     #-37-1,R0       ;MASK 37 APPLIED TO R0
1392  005542  004767  000724                  JSR     PC,OCTPNT       ;TAR
1393  005546  012700  006344                  MOV     #SEMS,R0        ;PRINT
1394  005552  004767  001056                  JSR     PC,TYPOUT       ;"SAR="
1395  005556  116700  001140                  MOVB    WORK2,R0        ;PRINT
1396  005562                                  ANDI    17,R0
1397  005562  042700  177760                  BIC     #-17-1,R0       ;MASK 17 APPLIED TO R0
1398  005566  004767  000700                  JSR     PC,OCTPNT       ;SAR
1399  005572  000207                          RTS     PC              ;EXIT
1400  005574  012767  000006  001112  PNTOCT: MOV     #6,TOG4
1401  005602  010067  001110          OLUP:   MOV     R0,WORK
1402  005606                                  ANDI    7,WORK
1403  005606  042767  177770  001102          BIC     #-7-1,WORK      ;MASK 7 APPLIED TO WORK
1404  005614  062767  000060  001074          ADD     #60,WORK
1405  005622  016746  001070                  MOV     WORK,-(SP)
1406  005626  006000                          ROR     R0
1407  005630  006000                          ROR     R0
1408  005632  006000                          ROR     R0
1409  005634  005367  001054                  DEC     TOG4
1410  005640  003360                          BGT     OLUP
1411  005642  012767  000005  001044          MOV     #5,TOG4
1412  005650  012600                  TOLUP0: MOV     (SP)+,R0
1413  005652                                  ANDI    61,R0
1414  005652  042700  177716                  BIC     #-61-1,R0       ;MASK 61 APPLIED TO R0
1415  005656  004767  000640                  JSR     PC,TTO
1416  005662  012600                          MOV     (SP)+,R0
1417  005664  004767  000632                  JSR     PC,TTO
1418  005670  005367  001020                  DEC     TOG4
1419  005674  003372                          BGT     TOLUP0
1420  005676  000207                          RTS     PC
```

```
1421
1422  005700
1423  005700  012700  006122          HDTYPE: PNTM    HDMS
1423  005700  012700  006122                  MOV     #HDMS,R0                ;PRINT MESSAGE
1424  005704  004767  000724                  JSR     PC,TYPOUT       ;POINTED TO BY HDMS
1425  005710                                  PNTM    GDMS
1426  005710  012700  006354                  MOV     #GDMS,R0                ;PRINT MESSAGE
1427  005714  004767  000714                  JSR     PC,TYPOUT       ;POINTED TO BY GDMS
1428  005720                                  PNTM    S2
1429  005720  012700  006162                  MOV     #S2,R0          ;PRINT MESSAGE
1430  005724  004767  000704                  JSR     PC,TYPOUT       ;POINTED TO BY S2
1431  005730                                  PNTOL   CYL
1432  005730  016700  000776                  MOV     CYL,R0          ;PRINT & OCTAL
1433  005734  004767  177634                  JSR     PC,PNTOCT       ;NUMBERS IN CYL
1434  005740                                  PNTM    S1
1435  005740  012700  006160                  MOV     #S1,R0          ;PRINT MESSAGE
1436  005744  004767  000664                  JSR     PC,TYPOUT       ;POINTED TO BY S1
1437  005750                                  PNTOL   HED
1438  005750  016700  000760                  MOV     HED,R0          ;PRINT & OCTAL
1439  005754  004767  177614                  JSR     PC,PNTOCT       ;NUMBERS IN HED
1440  005760                                  PNTM    S1
1441  005760  012700  006160                  MOV     #S1,R0          ;PRINT MESSAGE
1442  005764  004767  000644                  JSR     PC,TYPOUT       ;POINTED TO BY S1
1443  005770                                  PNTOL   SEC
1444  005770  016700  000742                  MOV     SEC,R0          ;PRINT & OCTAL
1445  005774  004767  177574                  JSR     PC,PNTOCT       ;NUMBERS IN SEC
1446  006000                                  PNTM    CARET
1447  006000  012700  006165                  MOV     #CARET,R0               ;PRINT MESSAGE
1448  006004  004767  000624                  JSR     PC,TYPOUT       ;POINTED TO BY CARET
1449  006010                                  PNTM    S1
1450  006010  012700  006160                  MOV     #S1,R0          ;PRINT MESSAGE
1451  006014  004767  000614                  JSR     PC,TYPOUT       ;POINTED TO BY S1
1452  006020                                  PNTM    BDMS
1453  006020  012700  006364                  MOV     #BDMS,R0                ;PRINT MESSAGE
1454  006024  004767  000604                  JSR     PC,TYPOUT       ;POINTED TO BY BDMS
1455  006030                                  PNTM    S2
1456  006030  012700  006162                  MOV     #S2,R0          ;PRINT MESSAGE
1457  006034  004767  000574                  JSR     PC,TYPOUT       ;POINTED TO BY S2
1458  006040                                  PNTOL   CYLR
1459  006040  016700  000674                  MOV     CYLR,R0         ;PRINT & OCTAL
1460  006044  004767  177524                  JSR     PC,PNTOCT       ;NUMBERS IN CYLR
1461  006050                                  PNTM    S1
1462  006050  012700  006160                  MOV     #S1,R0          ;PRINT MESSAGE
1463  006054  004767  000554                  JSR     PC,TYPOUT       ;POINTED TO BY S1
1464  006060                                  PNTOL   HEDR
1465  006060  016700  000656                  MOV     HEDR,R0         ;PRINT & OCTAL
1466  006064  004767  177504                  JSR     PC,PNTOCT       ;NUMBERS IN HEDR
1467  006070                                  PNTM    S1
1468  006070  012700  006160                  MOV     #S1,R0          ;PRINT MESSAGE
1469  006074  004767  000534                  JSR     PC,TYPOUT       ;POINTED TO BY S1
1470  006100                                  PNTOL   SECR
1471  006100  016700  000640                  MOV     SECR,R0         ;PRINT & OCTAL
1472  006104  004767  177464                  JSR     PC,PNTOCT       ;NUMBERS IN SECR
1473  006110                                  PNTM    CARET
1474  006110  012700  006165                  MOV     #CARET,R0               ;PRINT MESSAGE
1475  006114  004767  000514                  JSR     PC,TYPOUT       ;POINTED TO BY CARET
1476  006120  000207                          RTS     PC
```

```
1477
1478
1479  006122  020046  020040  020040  HDMS:   .ASCII  /&      CYLINDER  TRACK SECTOR@/
1480  006130  041440  046131  047111
1481  006136  042504  020122  052040
1482  006144  040522  045503  051440
1483  006152  041505  047524  040122
1484
1485  006160  040040                  S1:     .ASCII  / @/
1486
1487  006162  020040     100          S2:     .ASCII  /  @/
1488
1489  006165     046     100          CARET:  .ASCII  /&@/
1490
1491
1492  006167     046  042446  051122  ERMS1:  .ASCII  /&&ERROR AT ADDRESS @/
1493  006174  051117  040440  020124
1494  006202  042101  051104  051505
1495  006210  020123     100
1496
1497
1498  006213     046  046117  035104  OLDMS:  .ASCII  /&OLD:     @/
1499  006220  020040  020040  040040
1500  006226  047046  053505  020072  NEWMS:  .ASCII  /&NEW:     @/
1501  006234  020040  020040     100
1502  006241     046  040503  046114  SUBRMS: .ASCII  /&CALLED FROM SUBROUTINE AT @/
1503  006246  042105  043040  047522
1504  006254  020115  052523  051102
1505  006262  052517  044524  042516
1506  006270  040440  020124     100
1507  006275     046  050122  051503  CSMS:   .ASCII  /&RPCS= @/
1508  006302  020075     100
1509
1510  006305     046  050122  051105  ERMS:   .ASCII  /&RPER= @/
1511  006312  020075     100
1512
1513  006315     046  050122  051504  DSMS:   .ASCII  /&RPDS= @/
1514  006322  020075     100
1515
1516  006325     046  040503  036522  CYMS:   .ASCII  /&CAR= @/
1517  006332  040040
1518
1519  006334  020040  040524  036522  TAMS:   .ASCII  /  TAR= @/
1520  006342  040040
1521
1522  006344  020040  040523  036522  SEMS:   .ASCII  /  SAR= @/
1523  006352  040040
1524
1525  006354  043446  047517  036504  GDMS:   .ASCII  /&GOOD= @/
1526  006362  040040
1527
1528  006364  040502  036504  040040  BDMS:   .ASCII  /BAD= @/
1529
1530  006372  020040  051520  020075  STMS:   .ASCII  /  PS= @/
1531  006400     100
1532
```

```
1533  006401  000046  040504  040524  DAMS:   .ASCII  /&DATA= @/
1534  006406  020075  000100
1535
1536  006411  000046  042524  052123  ENDM1:  .ASCII  /&TEST CCMPLETE@/
1537  006416  041440  046517  046120
1538  006424  052105  040105
1539
1540  006430  040007                  BELL:   .ASCII  <7>/@/
1541
1542                                          .EVEN
1543
1544  006432  010446                  SAV05:  MOV     R4,-(SP)        ;SAVE R0-R5 ON THE STACK
1545  006434  010346                          MOV     R3,-(SP)        ;R5 WAS STACKED BY THE JSR
1546  006436  010246                          MOV     R2,-(SP)        ;R4-R3 ARE STACKED ABOVE IT
1547  006440  010146                          MOV     R1,-(SP)        ;WITH R0 ON TOP
1548  006442  010046                          MOV     R0,-(SP)        ;R5 HOLDS THE RETURN PC, BUT AN
1549  006444  000115                          JMP     (R5)            ;RTS WOULD POP THE STACK-SO JUMP OUT
1550
1551  006446  005726                  RESTO5: TST     (SP)+           ;MOVE SP OVER WORD SAVED BY JSR
1552  006450  012600                          MOV     (SP)+,R0        ;R0-4
1553  006452  012601                          MOV     (SP)+,R1        ;ARE POPPED
1554  006454  012602                          MOV     (SP)+,R2        ;IN LIFO
1555  006456  012603                          MOV     (SP)+,R3        ;SEQUENCE
1556  006460  012604                          MOV     (SP)+,R4        ;R5 IS POPPED BY THE RTS AND
1557  006462  000205                          RTS     R5              ;THE PC IS TAKEN FROM R5
1558
1559  006464  012702  000012          DECPNT: MOV     #10.,R2         ;DIVISOR OF 10 FOR DECIMAL PRINT
1560  006470  000402                          BR      DECREM          ;PROCESS AND PRINT NUMBER
1561  006472  012702  000010          OCTPNT: MOV     #8.,R2          ;DIVISOR OF 8 FOR OCTAL PRINT
1562  006476  004767  000060          DECREM: JSR     PC,IDIVR        ;DIVIDE (R0) BY (R2) WITH REMAINDER IN R1
1563  006502  010146                          MOV     R1,-(SP)        ;STACK REMAINDER
1564  006504  005700                          TST     R0              ;HAS NUMBER DEFLATED BELOW RADIX?
1565  006506  001402                          BEQ     POPTT           ;YES - POP AND PRINT
1566  006510  004767  177762                  JSR     PC,DECREM       ;NO - DIVIDE NUMBER BY RADIX
1567  006514  012600                  POPTT:  MOV     (SP)+,R0        ;POP NUMBER FROM STACK
1568  006516  062700  000060                  ADD     #60,R0          ;MAKE ASCII
1569  006522  032767  040000  171040  TTO:    BIT     #B14,SR         ;IF SR14=1,DELETE TYPEOUT
1570  006530  001010                          BNE     TTOLF-2         ;EXIT
1571  006532  010067  171030                  MOV     R0,TPB          ;PRINT CONTENTS OF R0
1572  006536  105767  171022          TTOLP:  TSTB    TPS             ;DONE YET?
1573  006542  100375                          BPL     TTOLP           ;NO - KEEP LOOPING
1574  006544  022700  000015                  CMP     #CR,R0          ;WAS CHARACTER A CR!
1575  006550  001401                          BEQ     TTOLF           ;YES - PRINT LINE FEED
1576  006552  000207                          RTS     PC              ;RETURN TO POPTT OR MAIN PROGRAM
1577  006554  012700  000012          TTOLF:  MOV     #LF,R0          ;PRINT LF
1578  006560  000760                          BR      TTO             ;EXECUTE PRINT
1579
1580  006562  010067  000116          IDIVR:  MOV     R0,DIVID        ;SAVE DIVIDEND
1581  006566  005000                          CLR     R0              ;CLEAR QUOTIENT AREA
1582  006570  005001                          CLR     R1              ;CLEAR ACCUM.
1583  006572  060201                  DIVLP:  ADD     R2,R1           ;ADD DIVISOR TO ACCUM.
1584  006574  020167  000104                  CMP     R1,DIVID        ;COMPARE TO DIVIDEND
1585  006600  100002                          BPL     DVEND           ;WHEN ACCUM PASSES DIVIDEND - EXIT
1586  006602  005200                          INC     R0              ;INCREMENT QUOTIENT THEN
1587  006604  000772                          BR      DIVLP           ;ADD AGAIN
1588  006606  001003                  DVEND:  BNE     DIVN1           ;JUMP TO GET REMAINDER
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1589  006610  005200                        INC     R0              ;NO REMAINDER - INCREMENT QUOTIENT
1590  006612  005001                        CLR     R1              ;REMAINDER OF 0
1591  006614  000207                        RTS     PC              ;EXIT
1592  006616  160167  000062      DIVN1:    SUB     R1,DIVID        ;FANCY FINAGLING TO
1593  006622  060267  000056              ADD     R2,DIVID        ;DETERMINE THE REMAINDER
1594  006626  016701  000052              MOV     DIVID,R1                ;REMAINDER TO R1
1595  006632  000207                        RTS     PC              ;EXIT WITH QUOTIENT IN R0
1596
1597  006634  010046      TYPOUT:   MOV     R0,-(SP)        ;STACK ADDRESS POINTER FOR MESSAGE
1598  006636  117600  000000  TPOFCH:  MOVB    @(SP),R0        ;FETCH ASCII BYTE
1599  006642  022700  000100              CMP     #100,R0         ;IS IT @(TERMINATOR)?
1600  006646  001411                        BEQ     TPOUTX          ;YES - EXIT
1601  006650  022700  000046              CMP     #46,R0          ;IS IT CRLF FLAG?
1602  006654  001002                        BNE     .+6             ;NO
1603  006656  012700  000015              MOV     #CR,R0          ;YES- CHANGE DATA TO CRLF
1604  006662  004767  177634              JSR     PC,TTO          ;  PRINT
1605  006666  005216                        INC     (SP)            ;MOVE POINTER TO NEXT BYTE
1606  006670  000762                        BR      TPOFCH          ;FETCH NEXT CHARACTER
1607  006672  005726      TPOUTX:   POP                             ;POP STACK TO REACH RETURN VECTOR
1608  006674  000207                        RTS     PC              ;EXIT
1609
1610  006676  000000      GOOD:     XX
1611  006700  000000      BAD:      XX
1612  006702  000000      DATA:     XX
1613  006704  000000      DIVID:    XX
1614  006706  000000      TOG1:     XX
1615  006710  000000      TOG2:     XX
1616  006712  000000      TOG3:     XX
1617  006714  000000      TOG4:     XX
1618  006716  000000      WORK:     XX
1619  006720  000000      WORK1:    XX
1620  006722  000000      WORK2:    XX
1621  006724  000000      WORK3:    XX
1622  006726  000000      UNIT:     XX
1623  006730  000000      ATNB:     XX
1624  006732  000000      CYL:      XX
1625  006734  000000      HED:      XX
1626  006736  000000      SEC:      XX
1627  006740  000000      CYLR:     XX
1628  006742  000000      HEDR:     XX
1629  006744  000000      SECR:     XX
1630  006746  000000      CYLA:     XX
1631  006750  000000      HEDA:     XX
1632  006752  000000      SECA:     XX
1633  006754  000000      TTG:      XX
1634  006756  000000      TEMP1:    XX
1635  006760  000000      MASK:     XX
1636  006762  000000      ROTOG:    XX
1637  006764  000000      LERR:     XX
1638  006766  176710      RPDS:     176710
1639  006770  176711      RPDS1:    176711
1640  006772  176712      RPER:     176712
1641  006774  176713      RPER1:    176713
1642  006776  176714      RPCS:     176714
1643  007000  176715      RPCS1:    176715
1644  007002  176716      RPWC:     176716
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1645  007004  176720                  RPBA:   176720
1646  007006  176722                  RPCA:   176722
1647  007010  176723                  RPSQ1:  176723
1648  007012  176724                  RPDA:   176724
1649  007014  176725                  RPDA1:  176725
1650  007016  176726                  RPM1:   176726
1651  007020  176727                  RPM11:  176727
1652  007022  176730                  RPM2:   176730
1653  007024  176731                  RPM21:  176731
1654  007026  176732                  RPM3:   176732
1655  007030  176733                  RPM31:  176733
1656  007032  176734                  RPB1:   176734
1657  007034  176735                  RPB11:  176735
1658  007036  176736                  RPB2:   176736
1659  007040  176737                  RPB21:  176737
1660  007042  176740                  RPB3:   176740
1661  007044  176741                  RPB31:  176741
1662  007046  000254                  RPIV:   .WORD   254
1663  007050  000256                  RPSV:   .WORD   256
1664  007052  000000                  DEBUG:  XX
1665          007252                  INBUF=DEBUG+200
1666          011552                  OUTBUF=INBUF+2300
1667
1668
1669          000001                          .END                    ;THAT'S ALL FOLKS!
```

```
ADTYPE  005352          1300    1362#
ADT1    005476          1366    1373    1378    1381#
ATNB    006730           714     989    1052*   1088    1623#
BAD     006700          1338    1611#
BDMS    006364          1336    1453    1528#
BELL    006430          1271    1540#
B0    = 000001           388#    406    1304    1362
B1    = 000002           389#    407    1307
B10   = 002000           398#   1084    1268
B11   = 004000           399#    717     992    1090
B12   = 010000           400#   1327
B13   = 020000           401#   1273    1322
B14   = 040000           402#   1240    1248    1569
B15   = 100000           403#    681     725     828     844     896     924    1054    1243    1315
B2    = 000004           390#    408    1295
B3    = 000010           391#    409    1292
B4    = 000020           392#    410    1289
B5    = 000040           393#    411    1298
B6    = 000100           394#    412
B7    = 000200           395#    688     725     828     844     896     924
B8    = 000400           396#   1286
B9    = 001000           397#
CARET   006165          1447    1474    1489#
CC    = 177776           357#    378     657*    699*    766*    868*
CHKAD   003464           736     850     934    1102#
CLRS    002610           874     951#
CLRS1   002620           953#    955
CMER    003622          1120    1122    1124    1127#
CR    = 000015           365#   1311    1574    1603
CS    = 000020           410#    678     683     690     719     728     831     847     899     927     994    1057    1086
                        1092    1096    1242    1246    1250
CSMS    006275          1342    1507#
CSTYPE  005242          1291    1342#
CYL     006732           710*    711     748*    749     794*    809     887*    888     907*    908     914*    915     944*
                         945    1119    1432    1624#
CYLA    006746           778*    824     839    1630#
CYLR    006740          1104*   1106*   1107*   1108*   1109*   1110*   1111*   1118*   1119    1459    1627#
CYMS    006325          1381    1516#
DA    = 000040           411#    678     719     728     831     847     899     927     994
DAMS    006401          1347    1533#
DATA    006702          1349    1612#
DATYPE  005264          1309    1347#
DD    = 000002           407#
DEBUG   007052          1081*   1082*   1664#   1665
DECCY   005464          1375    1379#
DECPNT  006464          1559#
DECREM  006476          1560    1562#   1566
DECTK   005440          1371    1374#
DIVID   006704          1580*   1584    1592*   1593*   1594    1613#
DIVLP   006572          1583#   1587
DIVN1   006616          1588    1592#
DS    = 000004           408#    678     683     719     728     831     847     899     927     994    1057    1086    1092
                        1096
DSMS    006315          1357    1513#
DSTYPE  005330          1297    1357#
DS1     003210          1049*   1051#
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DVEND   006606          1585   1588#
ENDM1   006411           753    853    948   1536#
ER    = 000010           409#   678    683    690    719    728    831    847    899    927    994   1057   1086
                        1092   1096
ERM   = 104400           405#   994   1057   1086   1092   1096   1127
ERMS    006305          1352   1510#
ERMS1   006167          1276   1492#
ERR   = 104000           404#   678    683    690    719    728    831    847    899    927   1242   1246   1250
ERROR   004664           633    635   1268#
ERTYPE  005306          1294   1352#
ERXIT   005106          1310#
ERXIT1  005122          1274   1313#  1314
GB    = 000001           406#
GBTYPE  005200          1306   1332#
GDMS    006354          1332   1426   1525#
GOGO    005000          1287   1289#
GOOD    006676          1334   1610#
HD    = 000100           412#   1127   1301
HDMS    006122           770   1423   1479#
HDTYPE  005700          1303   1422#
HED     006734           733*   743*   744    747*   798*   816*   817    818*   931*   940*   941    943*   1121
                        1438   1625#
HEDA    006750           782*   825    840   1631#
HEDR    006742          1103*  1104   1105*  1116*  1121   1465   1628#
HGL1    001652           820#   832
HGL2    001762           836#   848    851
HGO     001556           807#
HGO1    001746           830    833#
HGO2    002056           846    849#
HL1     001376           772#   777    781    784    785
HL2     001466           788#   793    797    800    802
HOME    003334           666    709    820    836    886    913   1079#  1087   1093   1097
HRDER   004544          1240#
HRN1    004556          1241   1243#  1249   1251
IDIVR   006562          1562   1580#
IL1     000614           659#
IL2     000676           672#   675
IL3     000710           674#   677
INBUF = 007252           722    735    807*   808*   809*   810*   811*   812*   813*   814*   815*   817*   819*
                         822    833*   834*   835*   838    849    920    932   1665#  1666
LERCHK  005144          1322#
LERR    006764          1637#
LERXT   005160          1325#
LF    = 000012           366#  1577
LUPCHK  005162          1327#
MASK    006760          1635#
MKBL1   002730           975#   979    985
MKBUF   002700           884    970#
NEWMS   006226           789   1500#
NOP   = 000240           379#
NSTR    003052           876    998#
NSWMES  004423           704   1222#
NS2     000634           666#   679    686
N0      004117           998   1183#
N1      004124           999   1184#
N2      004131          1000   1185#
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N3          004136          1001    1186#
N4          004143          1002    1187#
N5          004150          1003    1188#
N6          004155          1004    1189#
N7          004162          1005    1190#
N8          004167          1006    1191#
N9          004174          1007    1192#
OCTPNT      006472          1134    1281    1285    1386    1392    1398    1561#
OLDMS       006213           773    1498#
OLUP        005602          1401#   1410
OUTBUF=     011552           893     902     971    1666#
PARIN       003262           776     780     792     796    1065#
PC      =%000007             376#    641*    643*    645*    647*    659*    662*    663*    666*    701*    705*    706*    709*
                             736*    754*    768*    771*    774*    776*    780*    783*    790*    792*    796*    799*    820*
                             836*    850*    854*    870*    873*    874*    879*    880*    884*    886*    890*    913*    917*
                             934*    949*    956*    957*    958*    969*    986*    995*    997*   1040*   1041*   1050*   1056*
                            1061*   1064*   1065*   1067*   1075*   1077*   1101*   1126*   1128*   1131*   1134*   1135*   1139*
                            1142*   1157*   1160*   1167*   1245*   1247*   1258*   1265*   1272*   1277*   1281*   1283*   1285*
                            1288*   1291*   1294*   1297*   1300*   1303*   1306*   1309*   1312*   1325*   1330*   1333*   1335*
                            1337*   1339*   1340*   1343*   1345*   1346*   1348*   1350*   1351*   1353*   1355*   1356*   1358*
                            1360*   1361*   1382*   1386*   1388*   1392*   1394*   1398*   1399*   1415*   1417*   1420*   1424*
                            1427*   1430*   1433*   1436*   1439*   1442*   1445*   1448*   1451*   1454*   1457*   1460*   1463*
                            1466*   1469*   1472*   1475*   1476*   1562*   1566*   1576*   1591*   1595*   1604*   1608*
PIOK1       000764           682     688#
PNTOCT      005574          1335    1339    1345    1350    1355    1360    1400#   1433    1439    1445    1460    1466    1472
POP     =   005726           413#    685     693    1607
POPPOP=     022626           414#
POPTT       006514          1565    1567#
PRX         003332          1069    1071    1074    1077#
PS      =   177776           378#    671*    702*    911*
P0      =   000000           380#
P1      =   000040           381#
P2      =   000100           382#
P2L1        001056           707#    720
P2L2        001102           711#    729     751
P2L3        001236           736#    741     746
P2N1        001222           727     733#
P3      =   000140           383#
P4      =   000200           384#    671
P5      =   000240           385#
P6      =   000300           386#
P7      =   000340           387#    657     668     699     702     756     868     911
RESTOS      006446           684     692    1310    1551#
RIN         003774           663     706     957    1139    1161#
RLLUP       004650          1261#   1264
ROTOG       006762          1252*   1256*   1259*   1263*   1636#
RPBA        007004           722*    822*    838*    893*    920*   1645#
RPB1        007032          1656#
RPB11       007034          1657#
RPB2        007036          1658#
RPB21       007040          1659#
RPB3        007042          1660#
RPB31       007044          1661#
RPCA        007006           711*    824*    839*    888*    915*   1364    1367   1646#
RPCS        006776           670*    681     688     707*    713*    723*    724*    725     823*    827*    828     842*    843*
                             844     894*    895*    896     922*    923*    924     988*   1080*   1098*   1240    1243    1248
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                    1313    1344    1642#
RPCS1   007000       708*    885*    912*   1053*   1100*   1643#
RPDA    007012       672     674     712*    826*    841*    889*    916*   1365   1368   1648#
RPDA1   007014       825*    840*   1649#
RPDS    006766       714     716*    717     987*    989     991*    992    1054   1079*  1084   1088   1090   1093*
                    1359    1638#
RPDS1   006770      1094    1639#
RPER    006772      1354    1362    1640#
RPER1   006774      1641#
RPI     000732       667     680#
RPIV    007046       667*   1662#
RPIX    000750       684#    691
RPM1    007016      1650#
RPM11   007020      1651#
RPM2    007022      1652#
RPM21   007024      1653#
RPM3    007026      1654#
RPM31   007030      1655#
RPSQ1   007010      1647#
RPSV    007050       668*   1663#
RPWC    007002       669*    721*    821*    837*    892*    919*   1644#
RALUP   004622      1254#   1257
RTL     004636      1050    1259#
RTR     004610      1252#
R0    =%000000       368#    661*    704*    753*    770*    773*    785    787    789*   801    803    853*   872*
                     878*    948*    959*    960     962     964     966*   967    1039*  1043   1045   1046*  1052
                    1060*   1068    1130*   1132*   1133*   1140    1143   1145   1150*  1155   1159*  1164*  1166*
                    1255*   1262*   1271*   1276*   1278*   1279*   1280   1282*  1284*  1311*  1332*  1334*  1336*
                    1338*   1342*   1344*   1347*   1349*   1352*   1354*  1357*  1359*  1381*  1383*  1385*  1387*
                    1389*   1391*   1393*   1395*   1397*   1401    1406*  1407*  1408*  1412*  1414*  1416*  1423*
                    1426*   1429*   1432*   1435*   1438*   1441*   1444*  1447*  1450*  1453*  1456*  1459*  1462*
                    1465*   1468*   1471*   1474*   1548    1552*   1564   1567*  1568*  1571   1574   1577*  1580
                    1581*   1586*   1589*   1597    1598*   1599    1601   1603*
R1    =%000001       369*    1547    1553*   1563    1582*   1583*   1584   1590*  1592   1594*
R2    =%000002       370*    1546    1554*   1559*   1561*   1583    1593
R3    =%000003       371*    1545    1555*
R4    =%000004       372*     672*    674     735*    849*    877*    932*   952*   953*   967*   972*   977    981*
                    1102*   1103    1112    1544    1556*
R5    =%000005       373*     680*    684*    692*    775*    779*    791*   795*   876*   878    902*   903*   904*
                     929*    933     938*    951*    954*    971*    975*   976*   977*   1070   1275*  1280*  1286
                    1289    1292    1295    1298    1301    1304    1307   1310*  1549   1557*
R6    =%000006       374#
R7    =%000007       375#
SAVOS   006432      680     1275    1544#
SCFLG   003122       964     966*   1022#
SCSLT   003076       877     929     938     952     972     981    1008#
SEC     006736       734*    738*    739     742*    803*    808     933*   1123   1444   1626#
SECA    006752       787*    826     841    1632#
SECMES  004031       872    1173#
SECR    006744      1112*   1114*   1123    1471    1629#
SEKE    002776       890     917     987#
SEMS    006344      1393    1522#
SFCHK   002354       909     911#    918
SFCL1   002400       915#    928     946
SFCL2   002510       933#    937     942
SFCN1   002466       926     929#
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SFSL1   002122          871#    881
SFSL2   002154          878#    883
SFSL3   002176          884#    891
SFSL4   002220          888#    900     910
SFSL5   002320          903#    906
SFSN1   002306          898     901#
SFTER   004574         1248#
SIN     002630          880     957#
SIN1    002676          961     963     965     969#
SP    =:000006          367#    656*    686*    694*    698*    765*    867*    968*    996*   1076*   1125*   1132    1158*
                       1252    1253*   1259    1260*   1278    1284    1324*   1329*   1405*   1412    1416    1544*   1545*
                       1546*   1547*   1548*   1551    1552    1553    1554    1555    1556    1563*   1567    1597*   1598
                       1605*
SPACE   003242         1059#   1063    1075
SR    = 177570          356#   1268    1273    1315    1322    1327    1569
START1  000600          641     656#    698     765     867
START2  001346          643     765#
START3  002102          645     867#
START4  001014          647     698#
STMS    006372         1282    1530#
STR4    001034          694     702#
SUBER   003626         1129#   1288
SUBRMS  006241         1130    1502#
SWMES   004201          661    1194#
S1      006160         1060    1435    1441    1450    1462    1468    1485#
S2      006162         1429    1456    1487#
TAMS    006334         1387    1519#
TEMP1   006756         1634#
TKB   = 177562          359#   1164
TKS   = 177560          358#   1161*   1162
TKV   = 000060          362#
TOG1    006706          673*    676*    875*    882*    901*    905*    930*    936*    939*    970*    984*   1614#
TOG2    006710          973*    978*    982*   1615#
TOG3    006712         1616#
TOG4    006714         1400*   1409*   1411*   1418*   1617#
TOLUPO  005662         1416#   1419
TPB   = 177566          361#   1571*
TPOFCH  006636         1598#   1606
TPOUTX  006672         1600    1607#
TPS   = 177564          360#   1572
TPV   = 000064          363#
TTG     006754         1062*   1072*   1073    1137*   1147*   1633#
TTIL    003666         1139#   1156
TTIO    003654          783     799    1041    1065    1137#
TTIX    003756         1141    1157#
TTO     006522          958    1142    1157    1312    1415    1417    1569#   1578    1604
TTOLF   006554         1570    1575    1577#
TTOLP   006536         1572#   1573
TTRX    003772         1144    1146    1148    1160#
TYPOUT  006634          662     705     754     771     774     790     854     873     879     949    1040    1061    1131
                       1272    1277    1283    1333    1337    1343    1348    1353    1358    1382    1388    1394    1424
                       1427    1430    1436    1442    1448    1451    1454    1457    1463    1469    1475    1597#
UMES    004020         1039    1171#
UNIQ    003134          659     701     768     870    1038#   1042    1044
UNIT    006726          708     885     912    1045*   1047    1049    1053    1100    1622#
UNS1    003212         1048    1052#   1058
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URDY1   000620          660#
WORK    006716          974*   976    983*   1401*  1403*  1404*  1405   1618#
WORK1   006720          778    782    794    798    1070   1138*  1152*  1153*  1154*  1155*  1159   1619#
WORK2   006722         1365*  1368*  1369*  1370   1372*  1374   1376*  1377*  1379*  1389   1395   1620#
WORK3   006724         1364*  1367*  1380*  1383   1621#
WWW     003356         1082#  1083
XX    = 000000          377#  1317   1610   1611   1612   1613   1614   1615   1616   1617   1618   1619   1620
                       1621   1622   1623   1624   1625   1626   1627   1628   1629   1630   1631   1632   1633
                       1634   1635   1636   1637   1664
.     = 007054          434#   439    441    443    445    447    449    451    453    455    457    459    461
                        463    465    467    469    471    473    475    477    479    481    483    485    487
                        489    491    493    495    497    499    501    503    505    507    509    511    513
                        515    517    519    521    523    525    527    529    531    533    535    537    539
                        541    543    545    547    549    551    553    555    557    559    561    563    565
                        567    569    571    573    575    577    579    581    583    585    587    589    591
                        593    595    597    599    601    603    605    607    609    611    613    615    617
                        619    621    623    625    627    629    632*   640*   642*   644*   646*   648*   689
                        715    718    726    740    745    829    845    897    925    990    993   1055   1066
                       1085   1089   1091   1095   1163   1244   1290   1293   1296   1299   1302   1305   1308
                       1323   1328   1602
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ANDI	416#	1113	1115	1117	1149	1165	1384	1390	1396	1402	1413				
PNTM	421#	660	703	752	769	772	788	852	871	947	1038	1059	1129	1270	1422
	1425	1428	1434	1440	1446	1449	1452	1455	1461	1467	1473				
PNTOL	426#	1431	1437	1443	1458	1464	1470								

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ADD      670   903   904   968   983   996  1076  1102  1125  1155  1158  1253  1260  1324  1329
        1404  1568  1583  1593
BEQ      682   715   718   726   829   845   897   925   990   993  1048  1055  1089  1091  1095
        1141  1244  1249  1269  1287  1290  1293  1296  1299  1302  1305  1308  1316  1363  1371
        1375  1565  1575  1600
BGT     1410  1419
BHI      740   745   750   786   802   909   961  1044  1071  1074  1144
BIC      819  1114  1116  1118  1150  1166  1369  1385  1391  1397  1403  1414
BIS      723   817   823   842   894   922  1377
BIT      681   688   714   717   725   828   844   896   924   989   992  1054  1084  1088  1090
        1240  1243  1248  1268  1273  1286  1289  1292  1295  1298  1301  1304  1307  1315  1322
        1327  1362  1370  1569
BITB    1094  1374
BLOS     942   946  1146
BMI      963  1148
BNE      675   677   689   883   906   937   955   965   979   985  1063  1069  1083  1085  1120
        1122  1124  1241  1257  1264  1274  1323  1328  1570  1588  1602
BPL      727   830   946   898   926  1163  1314  1573  1585
BR       691   720   729   777   781   784   793   797   800   832   848   851   881   891   900
         910   918   928  1042  1058  1066  1087  1093  1097  1156  1251  1366  1373  1378  1560
        1578  1587  1606
CLC     1151  1254  1261
CLR      710   712   733   734   742   747   807   833   834   835   887   889   914   916   931
         943   974   975  1138  1581  1582  1590
CLRB     953
CMP      674   739   744   749   785   801   908   941   945   960  1043  1068  1070  1073  1119
        1121  1123  1140  1143  1145  1574  1584  1599  1601
COMB     966
DEC      676  1062  1082  1147  1256  1263  1372  1380  1409  1418
DECB    1376
EMT      404
HALT     377   440   442   444   446   448   450   452   454   456   458   460   462   464   466
         468   470   472   474   476   478   480   482   484   486   488   490   492   494   496
         498   500   502   504   506   508   510   512   514   516   518   520   522   524   526
         528   530   532   534   536   538   540   542   544   546   548   550   552   554   556
         558   560   562   564   566   568   570   572   574   576   578   580   582   584   586
         588   590   592   594   596   598   600   602   604   606   608   610   612   614   616
         618   620   622   624   626   628   630   755   855   950
INC      738   743   748   882   905   907   936   940   944   954   978   984  1072  1161  1586
        1589  1605
JMP      679   741   746   751  1549
JSR      659   662   663   666   680   684   692   701   705   706   709   736   754   768   771
         774   776   780   783   790   792   796   799   820   836   850   854   870   873   874
         879   880   884   886   890   913   917   934   949   957   958  1040  1041  1050  1061
        1065  1075  1131  1134  1139  1142  1157  1272  1275  1277  1281  1283  1285  1288  1291
        1294  1297  1300  1303  1306  1309  1310  1312  1333  1335  1337  1339  1343  1345  1348
        1350  1353  1355  1358  1360  1382  1386  1388  1392  1394  1398  1415  1417  1424  1427
        1430  1433  1436  1439  1442  1445  1448  1451  1454  1457  1460  1463  1466  1469  1472
        1475  1562  1566  1604
MOV      641   643   645   647   656   657   661   667   668   669   672   673   686   694   698
         699   702   704   707   711   721   722   735   753   765   766   770   773   775   778
         779   782   787   789   791   794   795   798   803   808   809   821   822   824   837
         838   839   849   853   867   868   872   875   876   877   878   888   892   893   901
         902   911   915   919   920   929   930   932   933   938   939   948   951   952   967
         970   971   972   973   976   977   981   982  1039  1045  1046  1049  1052  1060  1081
        1103  1104  1112  1130  1132  1137  1159  1252  1259  1271  1276  1278  1280  1282  1284
```

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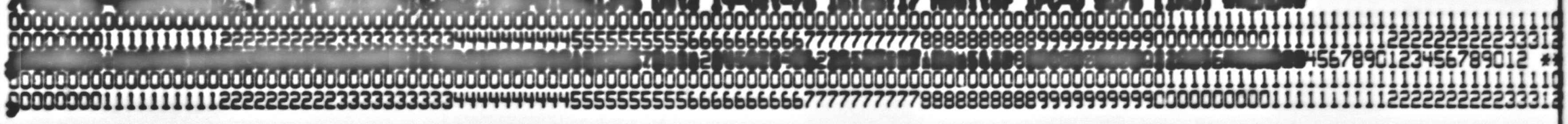
        1311  1332  1334  1336  1338  1342  1344  1347  1349  1352  1354  1357  1359  1364  1365
        1367  1368  1379  1381  1383  1387  1393  1400  1401  1405  1411  1412  1416  1423  1426
        1429  1432  1435  1438  1441  1444  1447  1450  1453  1456  1459  1462  1465  1468  1471
        1474  1544  1545  1546  1547  1548  1552  1553  1554  1555  1556  1559  1561  1563  1567
        1571  1577  1580  1594  1597  1603
MOVB     671   708   713   716   724   825   826   827   840   841   843   895   895   912   923
         987   988   991  1053  1079  1080  1098  1099  1100  1164  1389  1395  1598
NOP      737   935
RESET    658   700   767   869
ROL      810   811   812   813   814   815   816  1152  1153  1154  1262
ROR      818  1105  1106  1107  1108  1109  1110  1111  1255  1406  1407  1408
RTI      687   695  1318
RTS      956   969   986   995   997  1056  1064  1067  1077  1101  1126  1128  1135  1160  1167
        1245  1247  1258  1265  1325  1330  1340  1346  1351  1356  1361  1399  1420  1476  1557
        1576  1591  1595  1608
SUB      959  1133  1279  1592
TRAP     405
TST      962  1047  1551  1564
TSTB     964  1162  1313  1572
.ASCII  1171  1173  1183  1184  1185  1186  1187  1188  1189  1190  1191  1192  1194  1200  1206
        1214  1222  1230  1479  1485  1487  1489  1492  1498  1500  1502  1507  1510  1513  1516
        1519  1522  1525  1528  1530  1533  1536  1540
.BYTE   1025  1026  1027  1028  1029  1030  1031  1032  1033  1034
.ENABL   355
.END    1669
.EVEN   1238  1542
.LIST    355
.MACR    416   421   426
.NLIST   355
.PAGE    650   759   861
.REM       4
.REPT    435  1008  1022
.SBTTL   651   759   861
.TITLE   650
.WORD    633   634   635   636  1011  1012  1013  1014  1015  1016  1017  1018  1019  1020  1051
        1662  1663


ERRORS DETECTED:  0
DEFAULT GLOBALS GENERATED:  0

*,DZRPD/SOL/CRF/PAGNUM=DZRPD
RUN-TIME: 4 9 3 SECONDS
RUN-TIME RATIO: 66/17=3.7
CORE USED:  8K  (15 PAGES)
```

Spooler runtime 6 Seconds, 30 KCS, 166 disk reads, 4 disk writes, 45 pages